570001

PremierOil
Australasia

T/18P

WHITE IBIS-1
WELL COMPLETION REPORT
VOLUME 1 of 2

NOVEMBER 1998

3. GEOLOGICAL WELL COMPLETION REPORT

Prepared by: _____ Date: 8/1/99

David Evans
Operations Geologist

Approved by: _____ Date: Jan 21, 99.

B. Ulmer,
Operations Manager

Well: White Ibis-1

Surface Location	Latitude	39° 57' 49.607"S		**Participating Interests**	
	Longitude	145° 15' 17.234"N		Premier Petroleum (Australia) Ltd	35.1%
	UTM Co-ordinates	350945.86 mE		Boral Energy Resources Ltd	41.4%
		5574789.15 mN		CalEnergy Ltd	23.5%
	Elevation KB	12.5 m			
	Water Depth	61.9 m			
Permit	T/18P Bass Basin, Australia			Primary Objective	Intra-Eastern View Coal measures (EVCM) sandstones of Late Cretaceous to Palaeocene age
Spudded	19:30 hrs 1/6/98			Secondary Objective	Uppermost sandstones of the EVCM
Reached T.D.	00:30 hrs 19/6/98				
Abandoned	00:30 hrs 3/7/98			**Cement Plug Depths (mMD)**	
Rig Released	00:30 hrs 3/7/98			2,150 – 1,950m 150 – 105m	
Deviated Well	Straight Hole			1,908 – 1,808m	
				150 – 105m	
Rig	Northern Explorer III				
Type	Drillship			**Casing Details**	

Hole Size	26"/36"	17 ½"	12 ¼"	Size (in)	Wt (lb/ft)	Depth mMD
Depth (mMD)	132	866	2,220	30	310	130.6
				13-3/8"	68	863
Total Depth	2,220mMDKB			9-5/8"	53.5	1,878

Formation Tops	**Depth (mMD)**	**Depth (mSS)**	**Thickness (m)**	**High/Low (m)**	**Log TWT (ms)**
Torquay Group	74.4 – 1,430	61.9 – 1,417.5	1,355.6		
Demons Bluff	1,430 – 1,577	1,417.5 – 1,564.5	147.0	-10.5	1297
Top EVCM	1,577	1,564.5	643.0+	-17.5	1393
Top EVCM Sand	1,604	1,591.5	36.0		
Top Palaeocene	1,942	1,929.5	278.0+	+5.5	1601
Top EVCM 2,002 Sand	2,002	1,989.5	23.0		
Top EVCM 2,044 Sand	2,044	2,031.5	72.0		
Top EVCM 2,128 Sand	2,128	2,115.5	30.0		
Top Metamorphic Basement	2,158	2,145.5	62+	+45.5	1695

SUITE/ RUN	**TOOL STRING**	**INTERVAL (mMD)**	**BHT (°C)/TIME SINCE CIRC. (Hrs)**		**PLAYBACK SCALES**
1/1	PEX	2,210 - 75	94	11	1:200 1:500
1/2	FMS-Sonic	1,972 - 2,210	99	22.5	1:200 1:500
1/3	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 51 Pretests 2 samples
1/4	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 3 Pretests 1 sample
1/5	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 1 Pretest 1 sample
1/6	CMR – NGT	2,158 – 1,972	94?	63.5	1:200 1:500
1/7	CST	2,180 – 1,965	N/A	--	1:200 1:500
1/8	VSP	2,198 – 75	116	82	1:200 1:500
1/9	Array Sonic	2,210 – 850	120	87	1:200 1:500

Core	**Interval (m)**	**Cut (m)**	**Recovered (m)**	**%**
1	2,008 – 2,017m	9.0	0.72	8

No DST's were undertaken on White Ibis-1, MDT data was sufficient for the JV to decide to temporarily suspend White Ibis-1 as a sub-commercial gas discovery

CONTENTS

1.	**INTRODUCTION**	**1**
	1.1. Geological Summary	1
	1.2. Drilling Summary	1
2.	**WELL HISTORY**	**4**
	2.1. Formation Sampling	4
	2.1.1. Cores	4
	2.1.2. Sidewall Cores	5
3.	**LOGGING AND SURVEYS**	**6**
	3.1. Wireline Logging	6
	3.2. White Ibis Wireline Logging Record	7
	3.3. Mudlogging	9
	3.4. Temperature Data	9
	3.5. Deviation Surveys	10
	3.6. Velocity Survey	10
	3.7. MDT	10
	3.8. Petrophysical Analysis	10
	3.9. Suspension	11
	3.10. Palynology	11
4.	**GEOLOGY**	**12**
	4.1. Structure	12
	4.2. Well Stratigraphy	12
	4.3. Reservoir	17
	4.4. Hydrocarbon Occurrences	19
5.	**SELECTED BIBLIOGRAPHY**	**20**

TABLES

Table 1	Cuttings Samples
Table 2	Conventional Core Summary
Table 3	Wireline Logging Summary
Table 4	Mud Properties at Time of Logging
Table 5	Hydrocarbon Occurrences

FIGURES

Figure 1	Location Map
Figure 2	Cross-Section White Ibis 1 to Bass 3
Figure 3	Predicted vs Actual Section
Figure 4	Seismic Line

APPENDICES

Appendix 1	White Ibis Drilling Report
Appendix 2	Cuttings Descriptions
Appendix 3	Core Chip Descriptions
Appendix 4	Core Logs and Descriptions
Appendix 5	Routine Core Analysis
Appendix 6	Deviation Data
Appendix 7	Log Analysis
Appendix 8	MDT Analysis
Appendix 9	VSP Results & STC Processing Report
Appendix 10	Positioning Report
Appendix 11	Geoservice Report
Appendix 12	PetroLab Reservoir Fluid Study
Appendix 13	Petrological/Mineralogical Report
Appendix 14	Palynology Report

ENCLOSURES

Composite Well Log	(1:500)
Mud Log	(1:500)

1. INTRODUCTION

1.1. Geological Summary

The White Ibis-1 an exploration well located in permit T/18P was spudded on the 19 June 1998 in 61.9m of water using the Northern Explorer III drillship. T/18P is located in the offshore Bass Basin between Victoria and Tasmania (Figure 1).

The White Ibis-1 exploration well was planned as a straight hole well, with a target location 4300m northwest and approximately 45m updip at Top Palaeocene level of Esso's 1967 Bass-3 well. Bass-3 was plugged and abandoned after a Formation Integrity Test recovered 29cf of gas, 800cc of condensate and 12,259cc of discoloured water.

White Ibis-1 achieved the primary objective of intersecting at a crestal position, sands of Late Cretaceous to Palaeocene intra-Eastern View Coal Measures (EVCM), characterised by a prominent seismic Amplitude Versus Offset effect. The top reservoir sand was intersected 16m deep to prognosis. Three hydrocarbon bearing zones over the interval 2000 to 2155m were determined from MDT and wireline logs. The net effective pay over the interval is 22.7m from wireline logs, average porosity was 15.7%, average Sw 45.76%. The interval was not tested as the pay sands are thin and sufficient high quality data was acquired in the wireline logging and MDT testing program to allow the JV to abandon the proposed testing.

The secondary objective hoped to test a fault independent structural closure at the Top EVCM sands top sealed by Demons Bluff Formation shales. The Top EVCM was intersected 6m deep to prognosis at 1604mMD. No fluorescence or shows were noted in the sands and gas values did not increase above a background of 0.4%. (Figure 2).

The well reached a total depth of 2,220mMD on the 19 June 1998, at which time several attempts were made to run wireline logs before and after an additional wiper trip. 9-5/8" casing was run and cemented to 1,878m and an extensive suite of wireline logs was acquired. The well was temporarily suspended as a sub commercial gas discovery and the rig released on the 3 July 1998.

1.2. Drilling Summary

Mooring

The Northern Explorer III drillship sailed from the Yolla-2 location, some 43km to the South-west to the White Ibis–1 location arriving at 16:00 hrs on the 31 May 1998. Anchors 1 through 4, (13ton Stevpris type) were deployed forward and the remaining four 8ton Stevpris anchors were deployed aft. The MV Pacific Commander was used for anchor handling. The final position of the Northern

Explorer III at White Ibis-1 was 1.15m on a bearing of 272.6°(T) from the called location. White Ibis-1 was spudded on 1 June, 1998 at 19:30 hours. The water depth was 61.9m.

36" Hole/30" Casing

A re-run (from Yolla-2) Hughes CR-1 26" bit with 36" hole opener was used to spud White Ibis-1 and to drill to 132m. Viscosified polymer (treated KCl-PHPA mud left over from Yolla-2), and not Guar Gum sweeps as programmed were pumped every single. Anderdrift survey equipment failed to function in the top hole. The final Totco survey was 2.5deg at 125m. The hole was displaced with Hi-Vis gel mud prior to running the 30" conductor.

The 30" conductor was made up with the PGB tripped into the hole and cemented with the shoe set at 130.6m. The shoe was drilled out with the Hughes CR-1 26" bit and drilled to 133m prior to drilling the 17-1/2" hole section.

17-1/2" Hole/13-3/8" Casing

A new Reed Y11 rock bit and BHA were made up and drilled ahead from 133m to 441m initially with HiVis gel sweeps and later Guar Gum sweeps every single and taking Anderdrift surveys every second stand drilled. At section TD of 866m a 100bbl high vis gel sweep was circulated and the hole displaced with Hi-Vis gel mud. An EMS was dropped prior to tripping out of the hole. The Multishot survey indicated the hole deviation at TD to be 0.2°. Some tight hole was experienced and remedied during the trip out of the hole.

The 13-3/8" casing plus 18-3/4" wellhead joint were run and cemented as per the drilling program. The casing shoe was set at 852m. The rig was moved forward 10m to allow the BOP stack and riser to be run. The BOP stack was successfully pressure and function tested.

12-1/4" Hole/9-5/8" Casing

A Hughes 12-1/4" BD536HD PDC bit and new BHA were run into the hole and drilled out the float collar, shoe track and shoe plus 3m of new formation to 869m. The hole was circulated clean and displaced with KCl/PHPA/Polymer mud prior to performing a FIT (EMW=1.7sg). Drilling proceeded from 869m to 1,348m. A short wiper trip was made and prior to drilling ahead the rig waited on weather for 20 hours. When drilling resumed a depth of 1780m was reached, at which point mud losses downhole (50bbl/hr) were experienced. LCM was added and drilling continued to 1,944m when a pressure drop was noticed. A washout was located in the string and the single replaced. Drilling continued 1,944 to 2,004m with losses averaging 40bbls/hr. At 2,004m a 4m drill break was observed. When circulated to surface a good quality sand and 45% total gas was noted.

A trip was made to pick up the core barrel to cut Core#1. A 12-1/4" Corpro CM365F PDC core bit with 18m core barrel was tripped into the hole and cut Core #1 from 2,008m to 2,017m. At 2,017m the coring assembly jammed off and could not be re-engaged. The core barrel was tripped out of the hole and the core recovered at surface. Total core recovery was 0.72m or 8%.

A new MAXGT-PS09 was run in hole without a motor and drilled to a final total depth (TD) of 2,220mMD at 00:30hrs 19th June 1998 with basement confirmed at 2,017mMD. A further washout occurred and was rectified while drilling to TD. Bottoms up was circulated and a short wiper trip to the 13-3/8" casing shoe undertaken. The section 2,196m to 2,073m was backreamed due to excessive overpull/tight hole before pulling free. Intermittent overpull was however noted up to 1606m. An EMS was run once the bit was back on bottom. The final inclination was 0.5 degrees at 2,220mMD.

Three attempts were made to run wireline logs of different configurations prior to undertaking a wiper trip. A further three unsuccessful logging runs were attempted after the wiper trip before the decision was made to run 9-5/8" casing just above the zone of interest (a full description of events is included in section 3.2 wireline logging record).

A total of 152 joints of 9-5/8" casing was run and cemented with the float shoe at 1,878mMD. BOP's were tested and the wear bushing run prior to drilling out cement. Cement and float equipment was drilled with an 8-1/2" bit and the hole wiped to TD and circulated clean.

The logging runs comprising Suite#1 were:-

1. PEX
2. FMS-Sonic
3. MDT
4. CMR-NGT
5. CST-GR
6. VSP
7. Array-Sonic

After completing the wireline logging White Ibis-1 was temporarily suspended as a sub economic gas discovery with cement plugs over the following intervals: 2,150-1,950m, 1,908-1,808m, 150-105m. After pulling the BOP stack the wellhead was retrieved prior to running the corrosion cap. The Northern Explorer III departed location at 13:00 hours on the 30 May 1998. Appendix 1 contains a detailed White Ibis-1 Drilling Report.

2. WELL HISTORY

2.1. Formation Sampling

Drilling parameters only were recorded down to the 13-3/8" casing shoe at 863mMD. Cuttings were collected in the 12-1/4" hole once the BOP's and marine riser were connected.

Drill cuttings sample collection and distribution is summarised in Table 1. Descriptions of cuttings are included in Appendix 2.

Table 1 Cuttings Samples

Sample Distribution	Hole Section	Frequency (m)	Unwashed (Sets)	Unwashed (Quantity)	Washed and Dried (Sets)	Washed and Dried (Quantity)
Premier Oil Australasia	12-1/4" Hole	5m to 1,750m 3m to TD	1 1	300g 300g	1 1	100g 100g
Boral	12-1/4" Hole	as above	1 1	300g 300g	1 1	100g 100g
Mineral Resources Tasmania	12-1/4" Hole	-	not required	-	1 1	100g 100g
BRS Canberra	12-1/4" Hole	-	not required	-	1 1	100g 100g

2.1.1. Cores

The pre-drill program called for one 18m core to be cut in the Palaeocene to Early Eocene reservoir sequence (the Z3 sand equivalent in Yolla-2 if developed and hydrocarbon bearing in White Ibis-1). This sequence occurs over the interval 2,053-2,100mMD in Bass-3.

Continuous correlation of White Ibis mudlog data with the Bass-3 mudlog and wireline log data was maintained during drilling. A 4m drilling break was noted at 2,004 to 2,008m, 16m deep to prognosis. Bottoms up was circulated which revealed a good quality sand with an associated increase in background gas from 0.4% to 45% C1 through C5. Post wireline logs the sand was named the "2,002m sand".

Because of the success of the Yolla-2 coring program the same Corpro coring assembly was used. This incorporated a CM365F PDC antiwhirl face discharge core head with an 18m disposable aluminium inner core barrel and two bumper subs. Unfortunately having cut core from 2,008 to 2,017m at a good penetration rate of 21.6 m/hr the core barrel came off bottom and "jammed off" as the barrel tried to re-engage over the core stump. A total of 72cm of core (8%) was recovered from the barrel on surface, the longest piece being 12cm. The pieces of core resembled undergauge rock "biscuits". See Appendices 3 & 5.

The core pieces were described at the wellsite and then back loaded and shipped to the Geotech laboratory in Perth for processing and analysis. Because of the condition and fragmented nature of the core little if any meaningful routine core analysis data could be obtained. The routine core analysis procedure included core photography, and a single 1-1/2" plug being cut. The uncleaned (to save time) 1-1/2" plug provided a "quick" porosity/permeability/grain density measurement to aid with petrophysical analysis, prior to receiving wireline log data.

Porosity was 18.1%, permeability was 44mD and grain density 2.66 g/cc. The assumption was made that this piece of core came from a depth of 2008.05m. It can also be assumed that the core left in the barrel was possibly the most well cemented, and the better quality sands (more representative of the reservoir) were lost during the failed coring operation.

Wellsite core chip descriptions and core analysis/photographs are included in Appendices 3 & 5 of this report.

Table 2. Conventional Core Summary

Core	Interval (m)	Cut (m)	Recovered (m)	%
1	2008 – 2017m	9	0.72	8

2.1.2. Sidewall Cores

Because of poor core recovery a single SWC gun was run incorporating 30 bullets, 10 for palynology and 20 for sandstone petrology and mineralogy studies. Unfortunately meaningful thin sections for petrographic analysis could not be made because the rock fabric had been destroyed by the explosive charge in the SWC bullets. Sidewall core descriptions are documented in Appendix 4. Bulk and clay mineralogy XRD analysis added substantially to our understanding of reservoir sand composition and help further refine the petrophysical analysis. The petrological/mineralogical and palynology reports are included in Appendices 13 and 14 respectively.

3. LOGGING AND SURVEYS

3.1. Wireline Logging

The following wireline logs were run in the 12-1/4" open hole section:

Table 3
Wireline Logging Summary

SUITE/ RUN	TOOL STRING	INTERVAL (mMD)	BHT (°C)/TIME SINCE CIRC. (Hrs)		PLAYBACK SCALES
1/1	PEX	2,210 - 75	94	11	1:200 1:500
1/2	FMS-Sonic	1,972 – 2,210	99	22.5	1:200 1:500
1/3	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 51 Pretests 2 samples
1/4	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 3 Pretests 1 sample
1/5	MDT Pretests & Samples	1,901 – 2,129	111	55	1:200 1:500 1 Pretest 1 sample
1/6	CMR – NGT	2,158 – 1,972	94	63.5	1:200 1:500
1/7	CST	2,180 – 1,965	N/A	--	1:200 1:500
1/8	VSP	2,198 – 75	116	82	1:200 1:500
1/9	Array Sonic	2,210 - 850	120	87	1:200 1:500

Table 4
Mud Properties At Time Of Logging

Fluid Type	KCL/PHPA
Density (G/C3)	1.16
pH	10
Fluid Loss(C3)	5
Viscosity (sec)	52
Cl (ppm)	43,000
KCL (%)	6
Rm	0.147 at 14°C
Rmf	0.134 at 15°C
Rmc	0.16 at 19°C

A record of the logging operation follows.

3.2. White Ibis-1 Wireline Logging Record

INCOMPLETE OPERATIONS

19/6/98 - 22/6/98

Rig up PEX, and run in hole; the tools hung up at 918m. Numerous attempts were made to get past the obstruction. The tools were pulled out of the hole and the hole finder changed to a normal bottom nose and run back in hole. The PEX tool could not pass 941m so the tool was pulled and the original hole finder replaced and the tool run again. The tool failed to pass 936m. The logging tools were rigged down and a wiper trip to TD conducted. The drill string had to be washed and reamed all the way to TD.

After completing the wiper trip a PEX-Sonic combination was run in hole with the HALS centralised. The tool could not pass 940m after several attempts. A second wiper trip was undertaken and a Hi-Vis pill spotted across the troublesome zone. After completion of the wiper trip the same PEX-Sonic-HALS combination was run in hole to 1048m before hanging up. The tool was pulled out of the hole and 6.1m of chain attached to the bottom of the tool string and run in hole. Once again the tool could not pass 1,048m. It was therefore decided to run 9-5/8" casing to 1,878m in order that log data be collected across the reservoir section

PEX (HALS) Run Eccentered 1.5" stand off, hole finder

26/6/98 18:00 - 27/6/98 00:30

Because of the uncertain hole conditions below the 9-5/8" casing it was decided to modify the logging program in order to collect sufficient data to make tentative decisions on whether to test the well. The string was run in hole without experiencing any problems. The data was acquired in high resolution mode (1,800ft/hr) and cased hole GR and CNL data was acquired to 1,030m. Data quality was good despite the uncertainty of the invasion profile (the hole was logged 8 days after drilling).

FMS-Sonic

27/6/98 00:30 - 27/6/98 12:00.

The Array Sonic tool failed during its surface check and was replaced with the conventional BHC sonic, the same tool had been run in hole 3 times during the incomplete operations. Two passes were made with the FMS tool in order to increase the density of the imagery data, after which a cable head insulation problem was noted at 1,970m. The string was pulled out of the hole and the head problem fixed prior to running back in to acquire sonic data from 1,970m to the casing shoe. The Z&S (Asia) White Ibis FMS imagery study has previously been distributed.

MDT

27/6/98 12:00 - 28/6/98 18:35

During the first run in hole 51 pretests were completed, and a sample was attempted at 2,006m however the filter/flowline plugged on every attempt to take a sample. A 2 x 1 gallon segregated sample was acquired at 2,015.2m. The seal was lost when attempting to sample at 2,048.5m so the tool was pulled and the rubber packer replaced. On running back in hole an additional 3 pretests and a sample was taken at 2,048.5m. Seal integrity was again lost when attempting a sample at 2,079.4m resulting in the tool being pulled and rubber packer being replaced, prior to running back in hole and successfully collecting the sample.

Two sample chambers were drained on surface, sample 2,015.2m contained 14cf of gas C5+, 3% CO_2 and no H_2S. The sample from 2,079.4m contained 2.94cf of gas, and 7.5 litres of water with a total chlorides measurement of 23,000ppm. The 2 other samples were sent for analysis to PetroLab Adelaide. The report is included in Appendix 12.

CMR

28/6/98 18:35 - 29/6/98 02:30

This tool was initially planned to be run in combination with the PEX tool in order to further refine zones for MDT pressure and sample points. Because of the negligible core recovery and its poor quality, tool calibration against core was pointless. The broad assumption was made that Yolla-2 measured core properties had corresponded well with CMR results so it was expected that White Ibis-1 formation perimeters would be similar to the CMR response. After the tool was tuned, the main pass covered 2,158m to 1,972m at 170ft/hr. A repeat section was run over 2,011 to 2,001m at 170ft/hr. The data was of good quality and matched well with PEX density data across water-wet sandstone formations. Definition of gas-zones was enhanced by use of this tool.

CST

29/6/98 02:30 - 29/6/98 08:30

Although not ideal as there is a chance of leaving sidewall core bullets and wires in the wellbore, the CST program was brought forward. This was undertaken as strong winds at the time were outside operational safety limits for the cranes. Rather than wait on weather for the VSP survey to be started the CST survey was undertaken. One gun incorporating 30 bullets was run in hole and 30 sidewall cores recovered.

VSP

29/6/98 08:30 - 29/6/98 21:30

Although the tool was checked on surface, when it was run in hole, the arm and detector failed to function. The tool was pulled out of the hole and the electronics physically checked and found to be functioning perfectly. After running in the hole, 2 downgoing and 2 upgoing levels were recorded, before the arm and detector failed to close at 2,176m. It was decided at the time to carefully drag the tool up the hole and complete the survey as data could still be acquired. A total of 41 levels were acquired however the VSP signal deteroriates above 1230m due to the lack of cement bond.

Array Sonic

29/6/98 21:30 - 30/6/98 02:45

Due to the modified logging program because of poor weather conditions a second Array Sonic was able to be mobilised from Sale to the rig. The tool was succesfully surface tested and run in hole. Good quality waveforms where recorded from TD to 863m.

3.3. Mudlogging

Geoservices provided 24 hour formation evaluation and pressure engineering data during White Ibis-1 drilling operations. This information was provided to the operator in the form of reports, evaluation logs and via wellsite monitors. It was also the responsibility of the Geoservices crew to monitor pit volume and gas levels and report these to drilling personnel if tolerances were exceeded.

The mudlogging unit was operated by two data engineers and two mudloggers each working 12 hour shifts.

There are no gas data or cuttings descriptions from surface to 863mMD, prior to running the 13-3/8" casing, installing the marine riser and BOP's.

The mudlog is included as Enclosure 2.

3.4. Temperature Data

Maximum bottom hole temperatures recorded during each wireline logging run, are shown in Table 3. The Horner extrapolated bottom hole temperature (BHT) is 124.5°C at 2,220mMD. The geothermal gradient to this depth is 5.06°C/100m assuming a sea floor temperature of 12°C.

3.5. Deviation Surveys

Directional control for this well was provided by EMS survey tools and inclination only Anderdrift MWD surveys. From the seabed to 132m, the Anderdrift MWD surveys were taken every single. A Totco survey was taken prior to pulling out of the hole to run 30" casing. The tools showed 2.5° and 2.4° inclination respectively. The 17-1/2" open hole was surveyed with the Anderdrift MWD tool every second stand from 133m to 866m. An EMS survey was run prior to running the 13-3/8" casing, the data showed that inclination varied between 0.1 and 0.5 degrees. The Anderdrift tool was again utilised in the 12-1/4" hole (except when the coring assembly was in hole) and maximum hole angle was 0.5 degrees recorded with the EMS tool. Deviation data is summarised in Appendix 6.

3.6. Velocity Survey

A vertical incidence velocity survey was run by Schlumberger in open and cased hole. In total 41 levels were collected, above 2,196m. Check shot only data was acquired above 1,500m. The VSP signal is seen to deteriorate above 1,230m as there is no cement bond. The data were acquired in one logging run using the three component Dual Combinable Seismic Imager tool (CSI). An array of three Air-Guns was used as the source. The guns were positioned 5.5 metres below mean sea level. Recording was made on the Schlumberger Maxis 500 Unit using DLIS format. The velocity survey report is included in Appendix 8 for completeness (the JV having already received a separate report with enclosures).

3.7. MDT

A total of 51 pretests (4 unsuccessful because of tight rock) and 4 samples were aquired in White Ibis-1. The MDT pressure data was acquired over the interval 1,900 to 2,154mMD and established a common water gradient of 1.37 psi/m and the presence of 3 hydrocarbon bearing zones. The 3 hydrocarbon zones occur over the intervals 2,001.5 to 2,023mMD, 2,044 to 2,053mMD and 2,128 to 2,140mMD. The data obtained from the MDT was sufficient to determine that a cased hole DST need not be undertaken.

A thin (6-7 metre) volatile oil column was intersected at the base of the uppermost gas sand (2002 sand). Initial interpretation by Fekete Australia Pty Ltd (in Appendix 8) discounted this conclusion, however subsequent studies by the operator Boral Energy Resources Limited (also in Appendix 8) identified errors in the Fekete analysis. These errors when taken into account with other data from the well demonstrate conclusively that oil is present in the 2002 sand.

3.8. Petrophysical Analysis

A quick look log analysis was carried out by IKODA and was subsequently re-evaluated using a probabilistic method based upon a mineralogical model derived from quantitative XRD analysis of sidewall cores. Initial quick look petrophysical analysis suggested 22.70m of net hydrocarbon pay in the well all attributed to three Intra EVCM sands: the 2,002-2,023m, 2,044-2,053m and 2,128-2,140m sands. When the mineralogical model was used to refine the petrophysics the net pay increased to 23.5m. Both the quick look (July 1998) and detailed Petrophysical reports (October 1998) are included in Appendix 7.

3.9. Suspension

The well was suspended by setting one 200m open hole balanced cement plug across the hydrocarbon bearing sands. One 100m balanced cement plug across the 9-5/8" shoe and one balanced cement plug was set near seabed in 9-5/8" casing.

After plug#1 was spotted the well was displaced to corrosion inhibited mud, before plug#2 was set. Once the BOP's and riser where retrieved a corrosion cap was latched to the wellhead and the wellhead displaced with 1bbl of red Stack Magic oil. Additional details are contained in Appendix 1 (Drilling Report).

3.10. Palynology

Ten sidewall core samples were examined to provide Palynological age dating of Palaeocene to Late Cretaceous sediments. The sidewall cores were acquired in shale horizons and at maximum flooding surfaces. The age dating demonstrated that fault growth and facies change has probably occurred during the late Cretaceous between White Ibis-1 and Bass-3 (Figure 2). The Palynological report is included in Appendix 14.

4. GEOLOGY

4.1. Structure

The White Ibis-1 exploration well successfully tested a series of Late Cretaceous to Palaeocene Intra Eastern View Coal Measures (EVCM) stacked shoreline and delta plain reservoir/seal couplets in a fault dependent closure situated over a basement high west of the Yolla Trough (Figure 1). Seismic data acquired since the drilling Esso's 1967 Bass-3 exploration well have revealed that Bass-3 was drilled significantly off structure.

White Ibis-1 is situated crestally at the primary objective level and was drilled approximately 45m updip and 4.3km north west along strike from the Bass-3 exploration well. The earlier well was plugged and abandoned after an FIT recovered 29 cu ft of gas, 800cc of condensate and 12,259cc of discoloured water.

The secondary objective (Top EVCM sands) tested a mapped fault independent four way dip closure. Hydrocarbons where encountered at this level in Cormorant-1 in T/18P and in Yolla-1 in T/RL1, however, at the White Ibis-1 location hydrocarbon charge was absent.

The basic structural architecture of the Bass Basin became established during the Early Cretaceous with initial northeast-southwest extension. This is highlighted by the orientation of the major faults and troughs. During the Late Cretaceous to Pliocene times this was followed by thermal subsidence and by compression in the Miocene.

The Pelican, Yolla and Cormorant Troughs comprise the major depocentres and petroleum kitchens in the Bass Basin. The troughs are fault bounded half grabens that progressively developed during the active rifting and thermal subsidence phases of basin evolution.

The Top EVCM and Top Palaeocene were intersected approximately 6m deep to prognosis at 1,677mMD and 1,942mMD respectively in White Ibis-1. The Top Intra EVCM sand (2,002 sand) was intersected 16m deep to prognosis, and Top Basement 47 m deep to prognosis.

FMS imagery & Dipmeter (SHDT) data was acquired in the White Ibis-1 well in 12-1/4" hole from 1,948 – 2,214m. The SHDT and FMS data shows low magnitude tectonic tilt in the range of 2° to 5° in a broadly NNW to NNE direction. A broad NW-SE depositional strike direction can be inferred throughout much of the succession regardless of marine or continental origin. The dip pattern complies with the mapped seismic horizons. Z&S (Asia) Limited at the request of the Joint Venture undertook a detailed study of the White Ibis-1 FMS imagery and produced a separate report with all Joint Venture partners receiving a copy.

4.2. Well Stratigraphy

The primary reservoir target in the White Ibis-1 exploration well were the Intra-EVCM sandstones of Palaeocene to Early Eocene age. The prognosed secondary target sands (sandstones of the top EVCM), that are hydrocarbon bearing in Yolla-1 are developed in White Ibis-1, but have no hydrocarbon charge.

Torquay Group (Early Miocene to Present Day) Seafloor to 1,430mMD.

Returns to sea floor 73.5-866mMD.

Claystone with minor Limestone grading to Calcilutite in part 866–1,205mMD.

Claystone: grey to light grey, medium grey in part, slightly to very calcareous with depth, grades to Calcilutite, soft to firm, amorphous in parts, silty in part, trace very fine quartz grains, trace black specks, trace micromica, trace disseminated pyrite & pyrite nodules, blocky to sub blocky, massive in parts, trace to common fossil fragments.

Limestone: trace, off white, light grey to grey brown to pale yellow grey, argillaceous in parts, slightly dolomitic, grades to Calcarenite in parts, soft to firm, sticky in parts, trace fossil fragments, microcrystalline to cryptocrystalline, sub blocky, trace Calcite, no visible porosity, no shows.

Claystone with minor Sandstone, with trace Limestone 1,205-1,290mMD.

Claystone: light grey to occasional light brown grey, slightly calcareous decreasing with depth, arenaceous in part grading to Siltstone, common black carbonaceous specks, trace micromicaceous, trace disseminated and nodule pyrite, trace fossil fragments, soft to sticky, occasionally firm, blocky to sub blocky, slightly fissile in part.

Sandstone: light grey to light brown, very fine to fine grained, sub angular to sub rounded, moderately well sorted, moderately hard calcareous cement, trace kaolinite matrix, trace pyrite, trace glauconite, fossil fragments, trace black carbonaceous specks, poor inferred porosity, grades to Calcisiltite in part, no fluorescence.

Limestone: off white, yellow grey, moderate to very calcareous, slightly dolomitic in part, microcrystalline, trace forams, trace fossil fragments, soft to sticky, moderately hard in part, no visual porosity, grades to Dolomite in part.

Claystone with minor Siltstone & Limestone, trace Sandstone 1,290-1,430mMD.

Claystone: light grey to occasional light brown grey, slightly calcareous decreasing with depth, arenaceous in part grading to Siltstone, common black carbonaceous specks, trace micro-micaceous, trace disseminated and nodule pyrite, trace fossil fragments, soft to sticky, occasionally firm, blocky to sub blocky, slightly fissile in part.

Siltstone: light grey brown to brown white, moderately calcareous cement, common very fine grained well rounded quartz, argillaceous in parts, grades to very fine Sandstone in part, trace carbonaceous specks, trace glauconite, rare pyrite, moderately hard to hard, sub blocky to blocky.

Limestone: yellow grey to white, microcrystalline, very calcareous, slightly dolomitic, trace forams and fossil fragments, soft to moderately hard, no visual porosity.

Sandstone: light grey to light brown, very fine to fine grained, sub angular to sub rounded, moderately well sorted, moderately hard calcareous cement, trace kaolinite matrix, trace pyrite, trace glauconite, fossil fragments, trace black carbonaceous specks, poor inferred porosity, grades to Calcisiltite in part, no fluorescence.

Demons Bluff Formation (Late Eocene) 1,430 – 1,577mMD

Siltstone: light to grey brown to medium brown to dusky brown to dusky yellow brown, moderately hard–firm, occasionally soft, dispersive to amorphous, subblocky to blocky, occasionally subfissile, argillaceous in parts, moderately dolomitic cement, common very fine grained quartz, grades to very fine grained Sandstone in parts, trace glauconite, trace micromica, trace to common disseminated pyrite, trace pyrite nodules, trace fossil fragments.

Sandstone: light grey brown to moderate yellow brown, very fine to occasionally fine grained, firm to occasionally hard aggregates, sub angular to subrounded, moderately well sorted, trace pyrite, trace micromica, trace carbonaceous specks, trace fossil fragments, common dolomitic cement, trace siliceous cement, common clay matrix, poor inferred porosity, no fluorescence.

Claystone: Light blue grey to dusky brown, dusky brown, occasionally dark grey to brown black to black, soft to plastic, occasionally firm, subblocky to blocky, occasionally subfissile to fissile, dispersive in parts, non to slightly calcareous, trace very fine grained quartz, trace micromica, common disseminated pyrite, occasionally pyrite nodules, trace black carbonaceous specks, trace fossil fragments.

Dolomite: light to medium brown, firm to hard, occasionally soft, blocky, microcrystalline, silty, trace very fine grained quartz, grades to dolomitic Sandstone in parts, dull yellow mineral fluor, no cut fluorescence.

Eastern View Coal Measures (EVCM) 1,577-2,173mMD

Siltstone with minor Claystone interbeds and minor to trace Sandstone 1,577 – 1604mMD

Siltstone: light brown to brown, moderate yellow brown, occasional dark brown, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.

Claystone: grey brown to dark yellow brown, non calcareous, nil to slightly silty, none calcareous, disseminated and nodule pyrite, trace carbonaceous specks, trace to common fossil fragments, trace mica, sub-blocky to amorphous in part, soft to firm.

Sandstone: light grey, transparent to translucent, very fine to fine grained, occasionally medium grained angular to sub to rounded, moderately well sorted, minor glauconite, common carbonaceous specks, trace pyrite, dominantly loose, occasional dolomitic cement and kaolin matrix, hard to friable in part, poor visual porosity, no fluorescence.

1,604 – 1,640mMD.

Sandstone with minor Siltstone & Claystone Top EVCM Sandstone

Sandstone: clear to light grey, transparent to translucent, occasional coarse milky quartz grains, very fine to fine grained, predominantly very fine grained, occasionally medium grained, angular to sub to rounded, moderately well sorted, dolomitic cement, weak argillaceous matrix, trace disseminated pyrite, trace glauconite, common carbonaceous material, poor visual porosity, no fluorescence.

Siltstone: light brown to moderate yellow brown, occasionally dark brown grey, soft to dispersive, occasionally firm to hard, blocky to sub blocky, none to slightly calcareous, argillaceous matrix, trace to common micromica, trace pyrite, trace fossil fragments, trace carbonaceous specks.

Claystone: grey brown to dark yellow brown, silty, trace very fine green quartz, trace glauconite, trace micromica, common disseminated pyrite, trace to common fossil fragments, soft to firm, sub-blocky to blocky, occasionally dispersive and washing out.

Claystone interbedded with minor Siltstone & Sandstone Intra EVCM (Late Cretaceous to Palaeocene) 1,640-1,685mMD.

Claystone: light brown to light brown grey, grey, very slightly silty in part, common micro micaceous, disseminated pyrite, trace carbonaceous specks, slightly calcareous, sticky, very soft to firm, sub to bulky to amorphous in part.

Siltstone: yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub-blocky.

Sandstone: light grey, occasional yellow brown, transparent to translucent, very fine to fine grain, moderately well sorted, sub-angular to sub-rounded, rare glauconite, trace red lithics, trace carbonaceous specks, weak kaolin matrix and calcareous cement, moderately hard to friable, fair inferred porosity, trace mineral fluorescence.

Claystone with minor Sandstone, Siltstone & Shale interbeds 1,685-1,730mMD.

Claystone: white, light grey, occasional grey brown, greenish grey, trace mica and pyrite, carbonaceous specks, nil calcareous, slightly sticky, very soft to soft, occasionally firm, amorphous to sub blocky.

Sandstone: light grey, transparent to translucent, white, very fine to medium grain, occasional coarse, moderately well sorted, sub angular to sub rounded, trace pyrite and mica, trace red lithics, weak calcareous cement, kaolin matrix, loose to friable, poor inferred porosity, trace mineral fluorescence.

Siltstone: yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micromicaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.

Shale: medium grey, green grey, occasional light brown grey, slightly silty, micro micaceous, moderately calcareous, trace disseminated and nodule pyrite, trace carbonaceous specks, trace very fine quartz grains in part, firm to slightly hard, sub blocky to fissile, occasional semi laminated.

Sandstone with minor Claystone & Siltstone interbeds 1,730-1,770mMD.

Sandstone: clear, light grey, very fine to medium grain, occasional coarse, poor to moderately sorted, sub angular to sub rounded, occasional angular, trace disseminated pyrite, trace micro micaceous, trace carbonaceous specks, trace glauconite, rare red lithics, minor aggregates with kaolin matrix, minor calcareous cement, poor visible porosity, no fluorescence.

Claystone: light brown, brown grey, silty, slightly calcareous, trace disseminated pyrite, micro micaceous, trace carbonaceous fleck, trace lithic, sub-blocky to amorphous, sticky, soft to firm.

Siltstone: light brown grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae with depth, firm to moderately hard, massive to sub-blocky.

Sandstone with interbedded Claystone 1,770-1,942mMD.

Sandstone: light brown, light grey, translucent to transparent, white, very fine to very coarse grain, common coarse, poorly sorted, sub rounded to angular, trace disseminated pyrite & mica, trace siderite, weak to non calcareous cement, trace siliceous cement, trace kaolin matrix, friable to loose, good visible-inferred porosity, no to trace mineral fluorescence with depth.

Claystone: light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, soft to firm, sub-blocky to blocky, grading to Siltstone.

Siltstone: medium brown grey, dark grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae, trace pyrite, calcareous in part, trace Limestone, trace very fine quartz grains, firm to moderately hard, sub-blocky to sub-fissile.

Sandstone with interbedded Claystone with minor Siltstone & trace Coal seams 1,942-2,001.5mMD.

Sandstone: see reservoir section below.

Claystone: light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, trace carbonaceous specks, soft to firm, sub blocky to blocky, grading to Siltstone.

Coal: trace, black, dark brown black, dull to sub vitreous lustre, common silty, trace disseminated and nodule pyrite interbedded in part, sub-conchoidal fracture, sub blocky to sub fissile, brittle to hard.

4.3. Reservoir

The White Ibis-1 well intersected the top of the Intra EVCM reservoir sands at 2001.5m, 16m deep to prognosis. An additional two hydrocarbon-bearing sands where encountered at 2044m and 2128m respectively. The reservoir sands are described in detail below.

2,001.5 – 2,024.5mMD (EVCM 2002 sand)

Sandstone: clear to light grey, transparent to translucent, fine to coarse grained, predominantly fine to medium grained, occasional very coarse grains, loose, rounded to subrounded, moderately well sorted, predominantly loose with occasional cemented aggregates, trace carbonaceous specks, trace kaolinite matrix, trace red lithic fragments, good inferred porosity.

Fluorescence: 2,007-2,008m: trace faint yellowish orange fluorescence, slow streaming dull yellowish white cut fluorescence, dull orangish white residual ring.

CORE#1 : 2,008-2,017mMD. Recovered 8% 2,008-2,008.72m

Sandstone:Light grey, off white, light brown to frosted, translucent, very fine to coarse grained, predominantly fine to medium, moderately well sorted, sub rounded to sub angular, common kaolinite matrix, siliceous cement, trace carbonaceous matter, trace lithic fragments, trace mica flakes, friable, poor to moderate visible porosity.

***Fluorescence**: trace, dull yellow white pinpoint fluorescence, slow streaming dull greyish white cut, bright chalky white residual ring.*

2,024.5 – 2,044.0mMD

Siltstone: medium to dark grey to brown commonly micromicaceous, trace disseminated pyrite, rare to common black carbonaceous material, common very fine quartz grains, clay matrix, firm to brittle, sub blocky to sub fissile.

Claystone light grey to grey occasionally brown grey and green grey, calcareous, silty in parts, trace pyrite, trace micromicaceous, soft to firm, sub blocky to blocky.

Sandstone: As above, no fluorescence

2,044 - 2,053mMD (EVCM 2044 sand interval)

Sandstone: clear to light grey, transparent to translucent, fine to coarse grained, predominantly fine to medium grained, occasional very coarse grains, loose, angular to subrounded, moderately sorted, predominantly loose with occasional cemented aggregates, trace carbonaceous specks, trace kaolinite matrix, good inferred porosity.

2,053m - 2,128mMD

Claystone light grey to grey occasionally brown grey and green grey, calcareous, silty in parts, trace pyrite, trace micromicaceous, soft to firm, sub blocky to blocky.

Siltstone: medium to dark grey to brown commonly micromicaceous, trace disseminated pyrite, rare to common black carbonaceous material, common very fine quartz grains, clay matrix, firm to brittle, sub blocky to sub fissile.

Sandstone: As above, no fluorescence

2,128-2,140mMD (EVCM 2128 sand interval)

Sandstone: clear to light grey, transparent to translucent, very fine to very coarse grained, predominantly coarse grained, angular to subrounded, moderately sorted, trace kaolinite matrix, trace mica, trace pyrite, predominantly loose occasional aggregates, fair to good inferred porosity.

2,140-2153m

Siltstone: medium brown to dark grey brown in parts, firm to moderately hard, sub blocky to sub fissile, trace micromica and pyrite, locally common carbonaceous/coaly fragments/laminae, arenaceous in parts & grading to very fine silty sandstone.

Claystone: light to medium grey, brown grey to green grey in parts, firm to moderately hard, blocky to subfissile, slightly calcareous, micromica, trace pyrite fragments, silty in parts.

Sandstone: As above, no fluorescence.

2,158-2,223mMD Metamorphic Basement.

2,158-2,173mMD

Sandstone/Weathered Basement: clear grains to light grey, transparent to translucent grains, very fine becoming very coarse with depth, moderate to well sorted loose grains becoming very hard and dense, increasing amounts of light blue green weathered metaquartzite, common felspar mica, horneblende?, pyroxene

2,173-2,223mMD TD.

Metamorphic: White to milky white, translucent to transparent, pale red, purple to pink, occasional yellow brown & pale green, common blocky angular fragments, common feldspars and occasionally altered to kaolin, angular quartz crystals, trace pyrite and mica, trace dark green hornblende and black pyroxene, hard to very hard, common massive texture and granular in part.

4.4. Hydrocarbon Occurrences

Table 5
Hydrocarbon Occurrences

Depth (m) MD	Total Gas (%)	Shows	Lithology
2004-2010	Gas not circulated out during coring	Fluorescence: 2007 trace faint yellowish orange fluorescence, slow streaming dull yellowish white cut fluor, dull orangish white residual ring.	Sandstone:- clear to light grey, transparent to translucent, fine to coarse grain, predominantly fine grain, occasional very coarse grain, subangular to subround, moderately well sorted, trace kaolinite matrix, predominantly loose, trace black carbonaceous specks, trace red lithics, good inferred porosity. No fluorescence above 2007m.
2008	Gas not circulated out during coring	Dull yellowish white pinpoint, fluorescence, slow streaming dull, greyish white cut fluorescence, white residual ring	Sandstone:- off white to light grey to light brown to frosted, translucent, trace, very fine to coarse grained, predominantly fine to medium, subrounded to subangular, moderately well sorted, common kaolinite matrix, siliceous, cement, trace carbonaceous matter, trace lithic fragments, trace mica flakes, bright chalky, friable, poor to moderate visible porosity

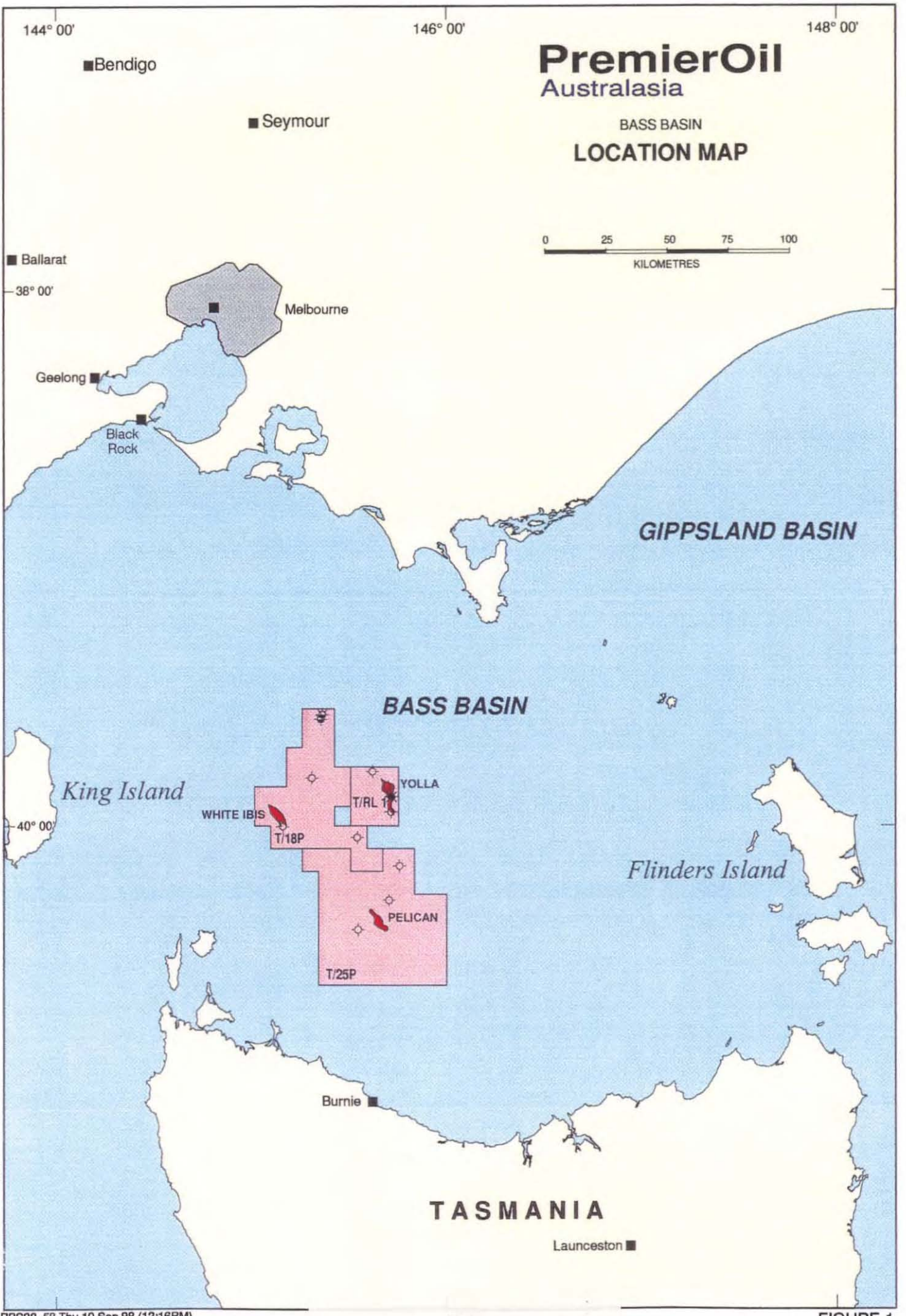
5. SELECTED BIBLIOGRAPHY

"White Ibis-1 Well Proposal T/RL1", 1998 Boral Energy Resources Ltd

"T/18P Well Prognosis White Ibis-1 Bass Basin", April 1998 PremierOil Australia Pty Limited

"White Ibis-1 Sedimentological Interpretation of Formation Micro-Scanner (FMS) Images Yolla-2" August 1998 Z&S (Asia) Limited

570026

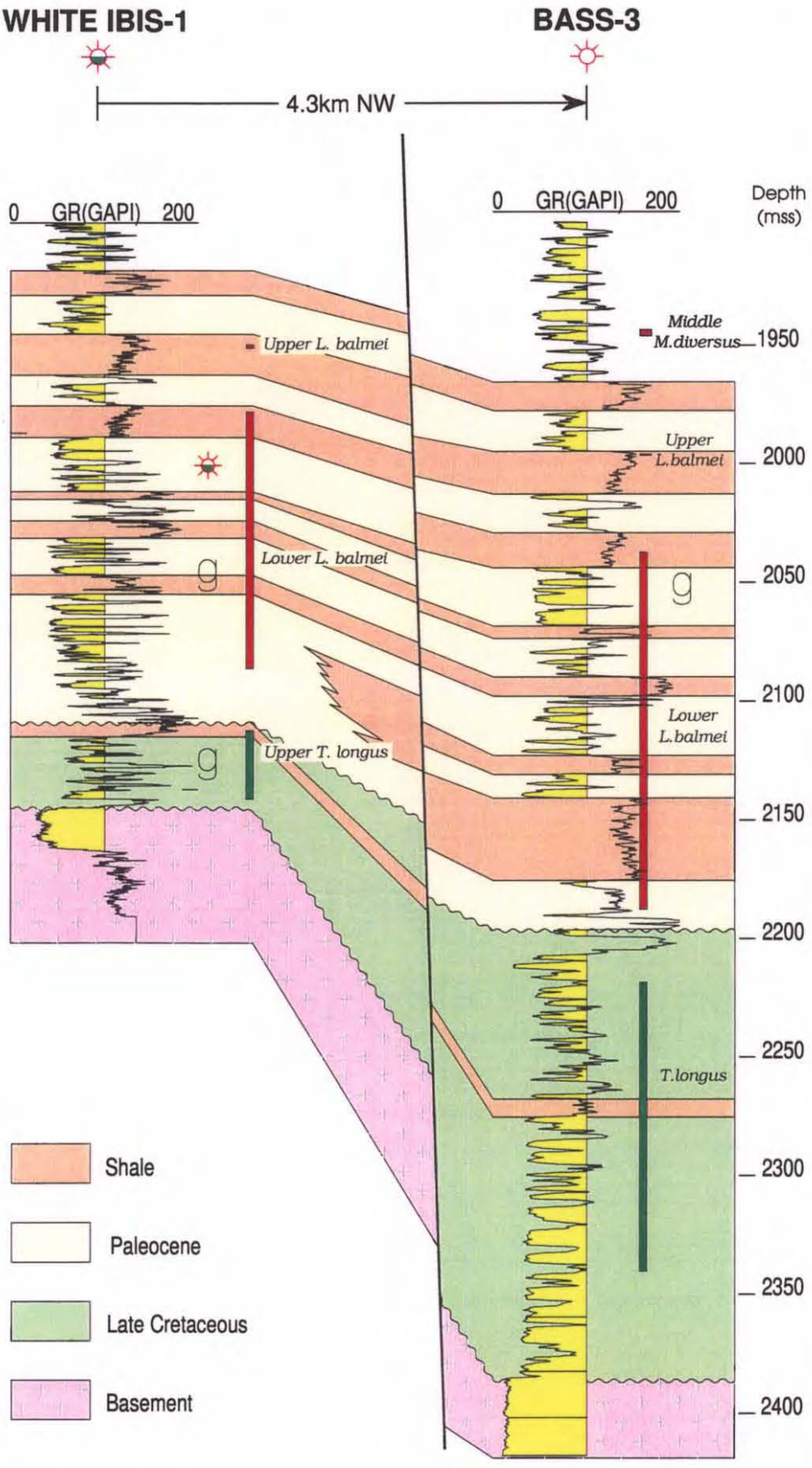


BIBRA L . SERVICE (08) 9481 3113

PBS98_53 Thu 10 Sep 98 (12:16PM)

FIGURE 1

570027



PremierOil
Australasia

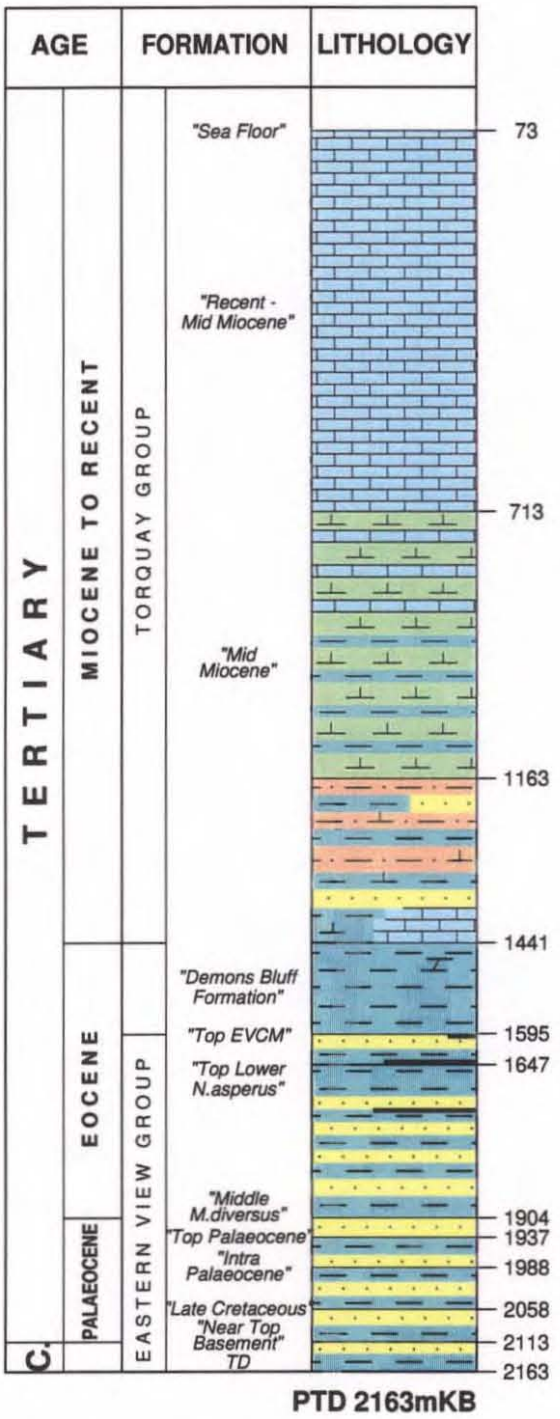
BIBRA D... /IG SERVICE (08) 9481 3113

PBS99__3 Wed 20 Jan 99 (10:18AM)

FIGURE 2

570028

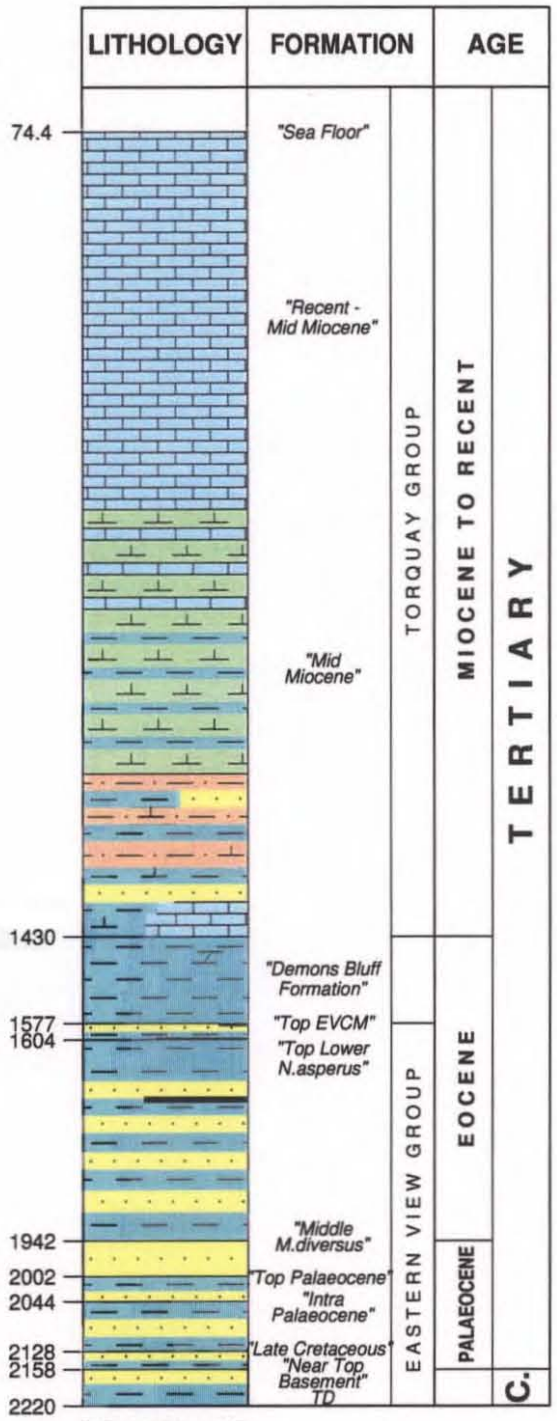
PREDICTED



PTD 2163mKB

(Depth in metres below K.B.)

ACTUAL



TD 2220mKB

PREDICTED Vs ACTUAL

LOCATION : T/RL 1

LATITUDE : 39°57'49.61"S

LONGITUDE : 145°15'17.28"E

ELEVATION : 12.5mK.B.

T.D. : 2220mK.B.

5 cm

PremierOil
Australasia

WHITE IBIS No. 1

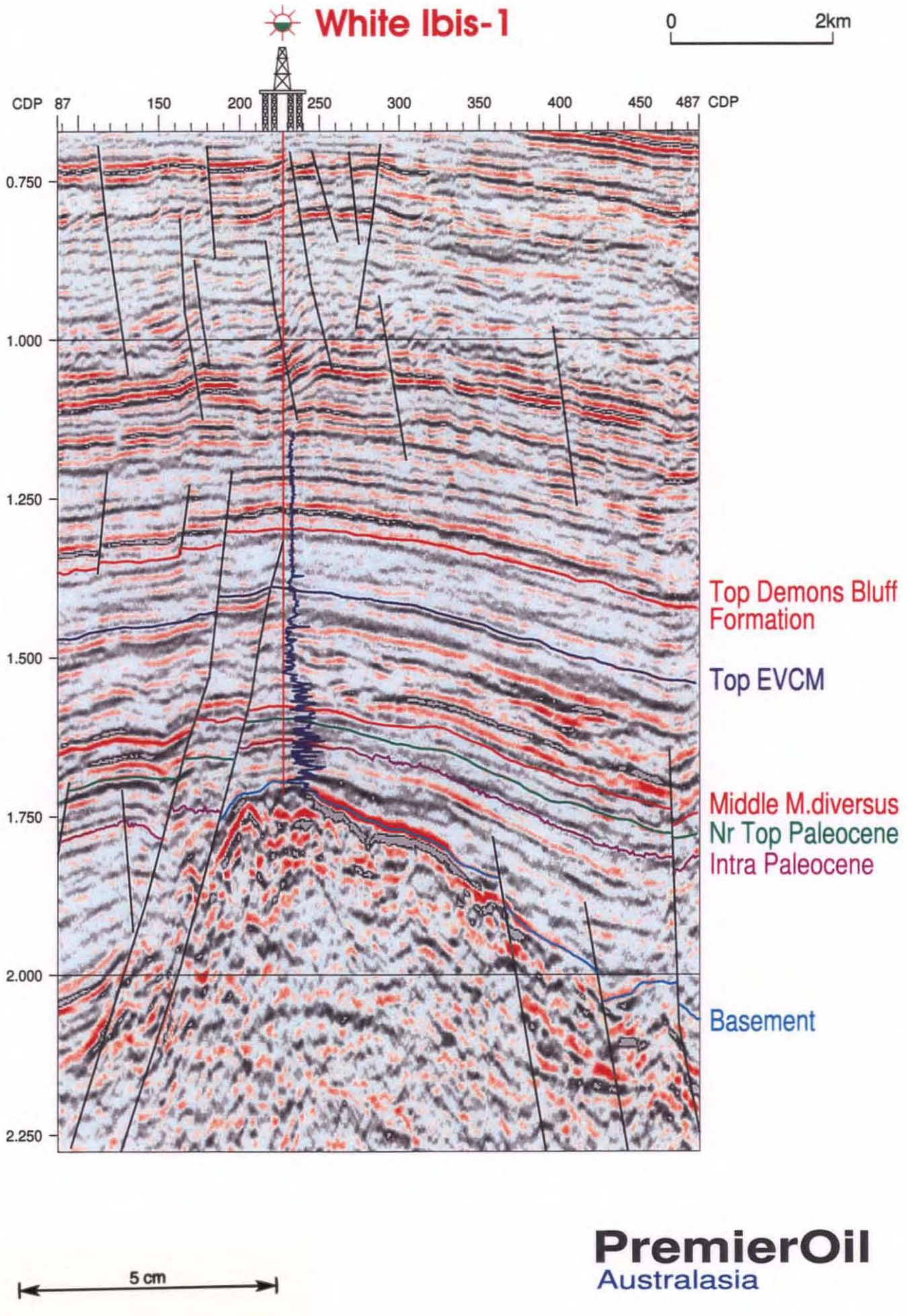
Author : D.E. Date : JANUARY, 1999

BIBRA DRA... ...G SERVICE (08) 9481 3113

PBS99__1 Thu 07 Jan 99 (11:37AM)

FIGURE 3

570629



PremierOil
Australasia

BIBRA DRAFTING SERVICE (08) 9481 3113

PBS99__2 Tue 19 Jan 99 (03:48PM)

FIGURE 4

APPENDIX 1

DRILLING REPORT

By

Premier Oil

WHITE IBIS 1

570031

PremierOil
Australasia

WHITE IBIS-1
BASS BASIN, TASMANIA, AUSTRALIA

WELL COMPLETION REPORT

DRILLING REPORT

AUGUST 1998

Exploration Well White Ibis-1

Well Completion Report

Prepared by:

Stuart Harrison, Drilling Engineer

Approved by:

Blaine M. Ulmer, Drilling Manager

CONTENTS

1.	**EXECUTIVE SUMMARY**	**1**
2.	**WELL DATA SUMMARY**	**2**
3.	**WELL OBJECTIVES COMPLIANCE**	**3**
4.	**SAFETY & ENVIRONMENTAL PERFORMANCE**	**4**
5.	**COST & TIME SUMMARY**	**5**
	5.1. Cost Breakdown	5
	5.2. Major cost over-runs	5
6.	**TIME BREAKDOWN**	**6**
	6.1. Key Time Breakdowns	6
7.	**FLAT TIME COMPARISON**	**7**
	7.1. 30" Conductor	7
	7.2. 13-3/8" Casing	7
	7.3. BOP/Riser Running	7
	7.4. 9-5/8" Casing Running	7
	7.5. Suspension	7
8.	**DRILLING PERFORMANCE SUMMARY**	**8**
	8.1. What Went Right?	8
	8.2. Drilling Related Problems	8
	8.3. Lost Time Summary	8
9.	**DRILLING OPERATIONS SUMMARY**	**9**
	9.1. Rig Mobilisation	9
	9.2. 26"x 36" Surface Hole	10
	9.3. 30" Conductor	10
	9.4. Drilling Out Cement in 30" Conductor	11
	9.5. 17-1/2" Hole Section	11
	9.6. 13-3/8" Surface Casing	12
	9.7. 12-1/4" Hole Section	14
	9.8. 12-1/4" Electric Logging Operations – Open hole 863m – 2220m MDRT	17
	9.9. 9-5/8" Casing	18
	9.10. 12-1/4" Electric Logging Operations – Open hole 1878m – 2220m MDRT	20
	9.11. Suspension	21
	9.12. Retrieve Anchors	21
10.	**FORMATION PRESSURE EVALUATION**	**23**
	10.1. 17-1/2" Hole	23
	10.2. 12-1/4" Hole	23

570034

TABLES

Table 1 HSE Report
Table 2 Formation Tops

FIGURES

Figure 1 Location Map
Figure 2 Abandonment Diagram
Figure 3 Time Depth Curve
Figure 4 Time Breakdown from Start of Contract
Figure 5 Planned vs Actual Bar Chart

APPENDICES

Appendix 1 Well Cost Estimate
Appendix 2 Well Summary
Appendix 3 Bit Record
Appendix 4 BHA Record
Appendix 5 Mud Record
Appendix 6 Casing Tallies
Appendix 7 Casing & Cementing Reports
Appendix 8 LOT Data
Appendix 9 Survey Data

1. EXECUTIVE SUMMARY

White Ibis-1 was drilled with the drillship "Northern Explorer III" in the T/18P block in the Bass Strait. The original cost and time estimates for drilling, coring, logging, and abandoning the well were US$7.58MM and 20 days.

The drillship arrived at the White Ibis-1 location in the Bass Strait Block T/18P at 16:00 hrs on 31st May 1998, and the well was spudded at 19:30 hours on the 1st June 1998. After drilling, logging and suspension, the rig was released from the well at 00:30 hrs on 3rd July 1998. The drillship then moved to Geelong for offloading. From Geelong the vessel demobilised to Singapore.

White Ibis-1 is the second well drilled in the Bass Strait by Premier Oil Australasia. The well was a vertical exploration well designed with twin geological objectives. The primary target was to appraise the hydrocarbon bearing potential of the intra Eastern View Coal Measures sandstones prognosed at a depth of 1595m MDRT.

One 18m core and a full suite of electric logs (and dependant upon shows optional MDT, FMS and CMR) were planned for formation evaluation. One core was cut from 2008 to 2017m MDRT with only 8% recovery.

Logs were attempted once the well reached TD, however hole problems at 918m and 938m would not allow the logging suite into the hole. After several attempts and a wiper trip it was decided to run 9-5/8" casing to above the zone of interest. This was run and cemented with the shoe at 1878m.

A full logging suite with additional CMR, FMS, NGT and an extensive MDT program was conducted. Hole conditions over the zones of interest were excellent resulting in high quality log data.

The well was drilled to 2220m MDRT and logged in 32.16 days against a planned 18 days.

The well was suspended by setting one open hole cement plug, one cement plug across the 9-5/8" shoe and a surface cement plug. The corrosion cap was fitted and oil pumped into the wellhead.

Following the suspension the Northern Explorer III departed the White Ibis-1 location bound for Port Geelong after a total of 35 days on site.

The final cost and time for anchoring, drilling, coring, logging, and abandoning the well were US$11.75MM and 35 days.

2. WELL DATA SUMMARY

Well Name	:	White Ibis-1
Classification	:	Exploration
Surface Location	:	Datum AGD 84
		Latitude 39° 57' 49.607'' S Longitude 145° 15' 17.234" E
	:	AMG Zone 55 C.M. 147° East
		Easting: 350945.86 mE Northing: 5574789.15 mN
Drillship Heading	:	272.6 (T)°
Drilling Contractor	:	Northern Offshore Ltd
Drilling Rig	:	Northern Explorer III
Rig on Location	:	16:00 hrs, 31st May 1998
Well spudded	:	19:30 hrs, 1st June 1998
Rig Moved Off Location	:	00:30 hrs, 3rd July 1998
Total Days on Well	:	35 days
Total Depth	:	2,220m MDRT (Drillers depth) 3,210m MDRT (Logger's HUD)
Rig Datum	:	RT-MSL - 12.5m WD - 61.9m RT-ML - 74.4m
Hole Sections		
26"/36"	:	132m MDRT
17-1/2"	:	866m MDRT
12-1/4"	:	2220m MDRT
Casing Setting Depths		
30"	:	130.6m MDRT
13-3/8"	:	863m MDRT
9-5/8"	:	1878m MDRT

3. WELL OBJECTIVES COMPLIANCE

Primary Well Objectives	Objectives Compliance
• Drill vertical well to test the early Eocene through late Cretaceous sands of Eastern View Coal Measures • Cut one 18m core • Run full suite of electrical logs, & depending on shows: MDT, FMS and CMR • Conduct cased hole test if hydrocarbons found	• Drilled vertically (0.5 deg @ 1944m) to programmed TD, Gas bearing sands were encountered • One 18 m core cut, only 8% recovery. • Full logging suite ran, with three tool failures (Array sonic, CSAT, VSP), all data acquired. • No well test performed.
Secondary Well Objectives	Objectives Compliance
• Establish gas zone productivity • Confirm reservoir fluid • Conduct DST if hydrocarbons found	• Log and MDT data confirmed zone. • MDT samples obtained. • Data obtained with out DST's
Safety and Environmental Objectives	Objectives Compliance
• No lost time accidents. • Successfully utilise water based mud throughout the well. • Implement H2S procedures if required.	• 1 LTAs, 1 x reduced duty injury • Objective achieved • No H_2S encountered.
Commercial Objective	Objective Compliance
• Mobilise rig, drill, log and abandon well within 20 days.	• Estimated Final Well Cost was 54.9% over the AFE.
Drilling Engineering Objectives	Objective Compliance
• Successfully drill well with modified casing program avoiding the need to TD in 216mm (8-1/2") hole. • Drill all hole sections with water based mud and avoid stuck pipe occurrences. • Minimise formation damage particularly in reservoir section. • Minimise weather downtime	• 9-5/8" casing had to be run in order to obtain logs. • Objective achieved. • Log data indicated limited formation damage. • Correct anchor pattern, wire length and rig heading minimised weather downtime.

4. SAFETY & ENVIRONMENTAL PERFORMANCE

The following safety & environmental statistics were recorded for the 35 days spent on the well:

Number of LTA during well	:	1 LTA
Restricted duty injuries	:	1
Minor injuries	:	5
Spills	:	None

The HSE incidents are detailed in Table 1.

5. COST & TIME SUMMARY

5.1. Cost Breakdown

Commercial performance can be presented as follows:

AFE cost	:	$ 7.586 MM
Actual total cost	:	$ 11.75MM

This equates to an over run of $4.165 MM or 54.9 % above the original AFE.

Cost/m to TD, Logs	:	5342 $/m
m/Day to TD, Logs	:	62.8 m/d

A full cost breakdown showing the AFE and Supplemental AFE breakdowns is in Appendix 1.

5.2. Major cost over-runs

The cost overruns were mainly due to the extended well time of 35 days, which was mostly a result of:

a) Drilling related WOW.

b) Logging – wiper trip & tools (MDT, Array Sonic) failing.

c) Having to run 9-5/8" casing in order to obtain logs of reservoir section.

6. TIME BREAKDOWN

The planned scope of work from move on location/run anchors through to P&A was anticipated to take 20 days. The actual time to move on location, drill, log & suspend being 35 days.

A time breakdown from contract commencement is shown in Figure 4.

6.1. Key Time Breakdowns

AFE days (drilling)	:	20
Actual days (drilling)	:	35
Lost time days (drilling)	:	15
Lost time (%)(drilling)	:	42 %

The drilling time depth curve and time distribution for White Ibis-1 is shown in Figures 3 & 5.

The pie chart in Figure 5 shows the percentage time breakdown of drilling phase operations from spud to P&A.

7. FLAT TIME COMPARISON

7.1. 30" Conductor

The 30" conductor was run and cemented in 31 hours against a planned 18 hours. The thirty one hours includes the time to make up the 18-3/4" wellhead housing, handle the 26" BHA, run in hole and drill out 30" shoe. The conductor casing was actually run in 17.25 hrs from running 30" conductor to recovering 30" CART.

7.2. 13-3/8" Casing

The 13-3/8" casing was ran and cemented in 39 hours against a planned 24 hours, with delays caused mainly by working in harsh weather with the rig pitch/roll causing problems in stabbing in the casing.

7.3. BOP/Riser Running

The BOP/Riser was run in approximately 44 hours against a planned 24 hours.

The additional time was almost singularly due to slow crews and awkward/cramped working conditions in the BOP stack storage area.

7.4. 9-5/8" Casing Running

The 9-5/8" casing was ran in order that the wireline logs could be obtained over the reservoir section. The casing took 64 hours to run, this was not in the plan for White Ibis-1 and therefore cannot be compared to any planned time. Again bad weather slowed operations with the winds causing 3.5 hours WOW as the cranes could not operate in winds over 30 knots. Pitch and roll also caused similar stabbing problems to the 13-3/8" casing job. This time also included the installation of the pack off assembly and cleaning out of the casing shoe.

7.5. Suspension

The suspension of the White Ibis-1 well took a total of 68 hours against a planned abandonment time of 48 hours.

Slow BOP/ riser handling and the requirement to layout all the drill pipe in the derrick caused the majority of the delays in this stage of the well. The period covers the completion of logging to the rig release from location.

8. DRILLING PERFORMANCE SUMMARY

8.1. What Went Right?

- Good boat performance during rig move & anchoring.
- Stevpris anchors used for hard seabed anchoring.
- Good cement job on 13-3/8" casing achieved, despite plugs not appearing to release during displacement.
- BOP latched and pressure tested on first attempt.
- Good PDC bit (Hughes BD536HD) selection with motor in 12-1/4" hole.
- Early identification of washouts prevented further problems, i.e twist offs.

8.2. Drilling Related Problems

- Limited experience caused slow running of BOPs / riser.
- 3 Washouts occurred in the drillstring during the 12-1/4" hole phase.
- Repeated problems running logs due to hole bridging off, which finally required 9-5/8" casing to be run to above the reservoir section.
- Failure of logging tools (MDT, Array sonic tool & CSAT)

8.3. Lost Time Summary

- Drilling related WOW.
- Logging – wiper trip & tools (MDT, Array sonic & CSAT) failing.
- Poor rig performance when running the BOP/riser.

9. DRILLING OPERATIONS SUMMARY

9.1. Rig Mobilisation

The rig arrived on the White Ibis-1 location at 16:00 hrs, 31st May 1998, with anchoring operations being completed at 19:30 hrs, 1st June 1998. All 8 anchors required the maximum of 750 ft of chain to secure the rig on the extremely hard seabed. Anchors #1- #4 (all forward anchors) were 13ton Stevpris type anchors, the remaining anchors #5 - #8 (all aft anchors) were 8ton Stevpris type anchors. Stevpris were used as thes are specifically designed for use with hard seabeds. The heavier anchors were used forward as this was the direction from which the prevailing weather originates. Anchors were tension tested to 200+ Kips.

Final position was confirmed at :

Latitude	:	39° 57' 49.607" S
Longitude	:	145° 15' 17.234" E

Rig Heading : 272.6° (T)

This was 1.15 m from the intended location on a bearing of 278.7°(T).

The following rig datum was established:

RT - MSL	:	12.5m
WATER DEPTH AT MSL	:	61.9m
RT-ML	:	74.4m

The time from starting anchoring operations until spud being 27:30 hours.

Key Learning/Recommendations

1. *Drill Ship cost effectively transported materials to site from Singapore and is a significant cost saving when considering drilling rig selection.*

2. *Large Stevpris anchors (13 – 15mT) are recommended when drilling in the Bass Basin due to the nature of the seabed.*

3. *Two AHSVs worked well in minimising anchor handling time on White Ibis-1 and two AHSV's should be recommended in future operations.*

4. *A site survey was performed at the White Ibis-1 location while Yolla-2 was being drilled. This was achieved by a local contractor and one of the AHSV boats already at the Yolla location. The survey involved two actual programs, the first being the sensor wotk (Seismic, Bathometry & Side Scan), the second being the coring and ROV work (6 x 6m core &, ROV observation of seafloor). No shallow gas surveys were conducted. It is recommended that site surveys are performed at the location of further wells prior to bringing a rig on location.*

9.2. 26"x 36" Surface Hole

26" x 36" Surface Hole Summary	
26" x 36" Surface hole from	74.4 m MDRT
26" x 36" Surface hole to	132 m MDRT
26" x 36" Surface hole length	57.6 m MDRT
Inclination at TD	2.5°

This section was drilled with a 26" Hughes Christensen CR-1 bit, re-run from, Yolla-2, in conjunction with a Servco GTA 36" hole-opener, to 132m MDRT (57.6m BML) using old mud from the Yolla-2 well with viscosifier and biocide added.

Prior to spud, an Anderdrift survey was attempted at the mudline, no pulses obtained. The well was spudded at 19:30 hrs, on the 1st June 1998 and the section was drilled trouble free. While drilling, Anderdrift surveys were attempted with no success. With the bit at 97m MDBRT a Totco survey was dropped (misrun), a further attempt was made before the Anderdrift gave a result of 2.5deg at 124m. This was confirmed by a final Totco, which was recovered on the trip out (inclination 2.5deg at 125m). Viscous polymer sweeps (50bbls) were pumped every single. Prior to pulling out, the hole was swept with a 100 bbl viscous polymer pill and the hole was displaced to HiVis gel mud. Viscous polymer sweeps were used instead of Guar Gum as programmed, as there were 760bbls of KCl -PHPA mud left over from Yolla-2, this was viscosified and treated for bacteria growth.

9.3. 30" Conductor

The 30" shoe float was checked by draining water through, before the 30" conductor was stabbed through the PGB in the moonpool. A shoe joint and 3 intermediate joints were run, each joint being filled with seawater, and each ST2 connector being cleaned and inspected before being made up. The 30" housing assembly was made up to the conductor and lowered to the rotary table. The 30" CART (with 1 joint of DP stinger) was then made up to the 30" conductor housing assembly then lowered and latched into the PGB.

The 30" conductor was run to the seabed on HWDP, stabbed into the 36" hole and ran to TD without problems.

The 30" conductor was run to 130.6 m MDRT with top of PGB at 72.2m MDRT. After pumping 104bbl of cement slurry a blockage occurred in the surge tank supply line. The line was cleared and a total of 282bbls of slurry were pumped (300 % excess in conflict with the 150% stated in the program). Good returns were observed at seabed by ROV after +/- 245bbls were pumped. Slurry was displaced with 50bbls seawater to leave 3bbls of cement inside the 30" casing. No blackfellow was observed and the 30" CART was backed out from the 30" housing and pulled out.

Key Learning/Recommendations

1. *26" x 36" BHA performed well in top hole*

2. *The use of the left over mud gave a small saving over using Guar Gum sweeps, however due to the time between Yolla-2 and White Ibis-1 (approx 10 days due to abandonment problems on Yolla-2) the polymers had deteriorated and required 2.6ppb viscosifier and Caustic & Biocide to control bacterial growth. In future in mud is to be saved consideration should be given to the time until the spudding of the next well.*

3. *Anderdrift only worked sporadically, possibly due to scale/rust in drill pipe. Anderdrift should be used as considerable rig time can be saved, but care must be taken not to pump and scale/rust down string. The tool failed to give surveys several times, but kept on giving signals later in the hole which suggests the blockages were washed away eventually as the tool never failed completely.*

4. *A problem occurred during the 30" cement job when a line from the bulk silo to the surge tank was found blocked with hard cement. This was cleared and the job proceeded. Rig air supplies to bulk system must be checked for wet air prior to use.*

9.4. Drilling Out Cement in 30" Conductor

A 26" BHA was run in hole and tagged hard cement at 125 m MDRT, 2m shallower than calculated. Hard cement and 30" shoe was drilled with seawater from 125m and the rathole was cleaned out to 132m. New formation was then drilled to 133m.

9.5. 17-1/2" Hole Section

17-1/2" Hole Summary	
17-1/2" hole from	133m MDRT
17-1/2" hole to	866m MDRT
17-1/2" hole length	733m MDRT
No. bit runs / Average ROP	1 / 21.4 m/hr
Inclination at TD	0.2 deg

A 17-1/2" Reed Y11 rock bit was used to drill this hole section. The hole was drilled from 133m MDRT to 441m MDRT with each single initially being swept with 35bbl HiVis gel sweeps and later to speed up mixing, 35bbl Guar gum sweeps. Anderdrift surveys being taken every second stand. Each stand was backreamed as a precaution. At section TD a 100bbl high vis gel sweep was pumped and the hole circulated clean at 1200gpm. The open hole was then displaced to 960bbls of 1.14sg high vis gel mud and an EMS survey was dropped prior to pulling out.

During pulling tight hole was experienced at 686m, in excess of 80klbs overpull. The jars were fired and the pipe worked but was not able to pass. The string was

wiped back in the hole circulating 1200gpm and when pulled 10kft–lbs torque were experienced at 673m, otherwise string pulled free without rotation or circulation. A wiper trip was performed and the hole was displaced 1.14sg mud. Overpull of 50-60klbs was experienced on the way out at 854m and 2-4klbs drag was experienced on the remainder of the trip out. The wellhead was jetted with seawater through the bit, to clear cuttings from the wellhead area.

The EMS survey probe was recovered at surface, and the survey data down loaded (surveys from 853.3m to 125.6m MDRT all between 0.1 and 0.5 degrees).

Bit was graded slightly worn teeth but the bearings were destroyed.

9.6. 13-3/8" Surface Casing

13-3/8" Casing Summary	
Weight / Grade / Connection / Drift	101 kg/m / L80 / NewVAM / special drift
13-3/8" shoe at	863m MDRT
17-1/2" hole to	866m MDRT
Casing hanger at	73m MDRT
Burst / Collapse rating	4930 / 2270psi
Pressure test	800psi

A total of 66 joints of 13-3/8" casing were run and cemented with the float shoe at 863m MDRT.

Prior to running in the hole the float shoe was checked by draining water through. The first 5 joints of casing were pre -Baker-locked and the collars torqued which saved some time. Centralisers were pre-fitted over the first 150m of casing as per program and each joint was filled with seawater.

The casing was stabbed into the conductor, with the aid of soft guidelines and run to 863m MDRT with further problems and only slight delays due to the handling difficulties in the harsh weather conditions. The 18-3/4" wellhead assembly was picked up from the derrick and made up to the casing. The CART was backed out from the wellhead and subsea plug launching mandrel and plugs were installed. After filling up all voids the CART was made up to the wellhead again and the 13-3/8" casing was run on HWDP to 852m MDRT without resistance.

After adding a HWDP pup joint for space out, the 18-3/8" wellhead was latched into the 30" wellhead housing with 13-3/8" casing shoe at 863m MDRT. Latching was confirmed by a 50klbs overpull.

The casing was circulated clean with seawater at 10BPM. The cement unit was lined up and the lines were pressure tested to 3500psi. The ball for the bottom plug was released and 586bbls of 1.44sg extended lead cement slurry was pumped. This

was followed by 134bbl of 1.9 sg Class "G" at 3 to 5BPM (100% excess on all open hole volumes).

The dart for the top plug was released and chased from the cement unit with seawater at 6BPM. A pressure increase of 400psi was observed before dropping off (theoretical shear is 1950psi). The slurry was then displaced with 380bbls by the rig pumps. However due to the low shear pressure of the plugs the displacement was cut short to avoid a wet shoe track.

No plug bump was observed the pressure was bled off and checked for backflow. No backflow was observed and the CART was unlatched and the running / cementing string was pulled out of hole.

The rig was moved forward 10m while preparations were made to run BOP's.

The ball joint was set in the spider, the choke & kill line flex loops were installed and the first 50' riser joint was connected. The pressure line was balanced and the beacon and bullseyes were placed on the BOP. The first riser was made up to the BOP and the BOP and first riser joint was lowered into the water. On making up each joint, the box connections were cleaned, the kill & choke line stab seals and the riser connector seals were redressed and each joint was made up and pressure tested to 500psi (5 Min) and 6000psi (10 Min).

After running BOP's to 10m above wellhead, the slip joint was picked up and landed out on the packer element. The riser landing joint was then picked up, made up to the slip joint and lowered. The kill & choke line goose necks were nippled up to the slip joint and the clamps made up. The MRTs were connected to the slip joint and kill & choke lines were tested, with the kill line stab seals needing to be replaced. The rig was then manoeuvred over the wellhead and the rig heading adjusted to align the BOPs over the guide posts.

The ROV observed the wellhead had been totally buried under seabed debris. Rigged up and ran 17-1/2" bit through riser to jet wellhead. Jetted wellhead with 1200gpm through bit until ROV observed top 0.5m of wellhead clear.

BOP's were lowered and guide posts aligned but H4 connector could not be latched due to 4" of fill. Blind rams were closed and the wellhead jetted through the Choke and Kill lines with 1000gpm. ROV observed wellhead profile clear.

The BOP was lowered, landed and latched with 35klbs were set down, and the BOP connector locked to the wellhead. This was positively checked with a 50klbs overpull. The locking pins were removed and the slip joint was telescoped out, the landing joint laid down and the diverter assembly installed. The diverter was function tested and both overboard lines flushing with water.

The casing was tested to 1000psi for 30 Min and found to be holding. Following the casing test, the BOP test plug was run and the BOP was tested (upper and lower

annulars 5 min at 250psi and 10 min at 3500psi and upper, middle and lower pipe rams for 5 min at 250psi and for 10 min at 5000psi). All pressure tests held. The test plug was pulled and the wear bushing was run.

Key Learning / Recommendations

1. *The ROV observed the wellhead was completely covered with cuttings when it was jumped for the latching of the stack. The same was observed clear after the 13-3/8" casing had been cemented. The area was jetted with a bit when the H4 connector was just above the wellhead and required further jetting through the choke and kill lines before latching. Recommendation is to use jetting sub to clear entire wellhead/PGB area, prior to running casing, when drilling long sections with returns to seabed. It was seen on White Ibis-1 that the well was spudded in a crater and that the required 2.4m stick up of the PGB was from the bottom of the crater so the room for cuttings to spill onto seafloor was greatly reduced and the build up around the wellhead was evident. ROV inspection of seafloor prior to spud and during drilling of long hole sections with returns to seabed must be done regularly.*

2. *A problem occurred during the 13-3/8" cement job. The dart to shear the top cement plug was released and displaced down the drillpipe. After 5bbl (theoretically 2.3bbl) of displacement, the pressure increased to 400 psi (instead of a theoretically 1950psi required for shearing out the top plug). The top plug was not bumped after the calculated displacement with the rig pumps, and therefore the casing could not be pressure tested right away. Consideration could be given to displacing the job using the Dowell unit rather than the rig pumps for greater accuracy. Exact volume of how much excess displacement could be pumped (if the plug should not bump) without risking over-displacement and a wet shoe should be calculated and agreed upon.*

9.7. 12-1/4" Hole Section

12-1/4" Hole Summary	
12-1/4" hole from	863m MDRT
12-1/4" hole to	2220m MDRT
12-1/4" hole length	1357m MDRT
No. bit runs / Average ROP	2 / 14.5m/hr
Inclination at TD	0.5°

A 12-1/4" Hughes Christensen BD536HD PDC bit was made up with an Anadrill A962XP motor and ran in hole. The bit tagged hard cement at 834m MDRT, hard cement was drilled from 834m to the float collar at 839m MDRT, displacement to 1.1sg KCl/PHPA mud began when drilling the cement. The float collar and shoe track was drilled to 862.5m MDRT, where the float shoe was drilled. Some problems were encountered in this section due to the bottom plug spinning requiring the bit to be spudded on the plug. After drilling out the shoe at 863m MDRT the rat

hole was cleaned out and 3 m of new formation was drilled with a 100bbls HiVis sweep being pumped and the hole circulated clean until balanced mud weight at shakers.

The bit was pulled back to inside the shoe and a FIT performed. No leak-off occurred, and a maximum EMW of 1.7sg was established.

SCR's were taken prior to drilling ahead with the motor, 270 bit rpm, from 869m – 1348m with occasional motor/string stalling due to the rigs poor heave compensation. A short wiper trip to 751m was performed when rising weather and a poor forecast made it necessary to pick up and land the hang off tool in the wellhead. The riser spider was installed and 20hrs was spent WOW.

The hang off tool was retrieved and on the trip in a ledge was encountered at 1037m this was reamed until clear and the trip in continued until 1265m. At 1265m the TDS was made up and precautionary washed/reamed to 1348.

The 12-1/4" hole was drilled with motor from 1348m – 1780m when 50bbls/hr losses were encountered, LCM was added and drilling continued until 1900m when the centrifuge was started to control the low gravity solids. Drilling continued with motor until 1944m when a gradual pressure drop was noticed, the surface systems were checked and then the string was pulled out of hole wet looking for a washout.

The washout was found 7 stands off bottom, 0.5m below tool joint on middle single. The single was changed out and the string ran back to bottom. Drilling continued with motor from 1944m to 1989m when a 4m drilling break was observed. This was circulated to surface for samples to identify the coring point.

Drilling was resumed from 1989m to 2004m, with losses still constant at approximately 40bbls/hr, when another 4m drilling break was observed. This was circulated to surface for samples, 45% gas registered in the returns and 70% good sand observed. The gas was circulated out and the well flow checked – static.

Coring point was confirmed and the BHA was pulled out to run the coring assembly. On the way out generally 10-20klbs overpull with 50-60klbs was observed between 1159m and 1150m. Flow checks with BHA below 13-3/8" shoe and below BOPs were conducted.

When out of hole, the motor was flushed and layed out, meanwhile the hole was taking 90bbls/hr static. The mud level was allowed to drop 4-5m and observed to stabilise at that level.

The coring assembly consisting of a Corpro low invasion CM365F PDC core head, 18m core barrel and 2 Baash Ross bumper subs was run in hole to top of HWDP when circulation was broken. At this time the weather was building rapidly so the hang off tool was made up and run. After 2.5hrs WOW the hang off tool was retrieved and the coring assembly was run in hole. The assembly stood up at 928m

and had to be washed/reamed to 2008m. Bottoms up were circulated, the ball was dropped and SCR's taken.

At 2017m MDRT, the assembly jammed off, an unsuccessful attempt was made to restart, and the assembly was pulled. Flow checks with BHA below 13-3/8" shoe and below BOPs were conducted. After the BHA was racked back in the derrick, the inner core barrel was pulled and broken out and found to be empty except 120mm of undergauge core jammed in the second 6m section. The core head was broken out and was found packed with 20-40mm 'pancake' shaped disks of undergauge core. Total core recovery 0.72m or 8%.

A new MAXGT-PS09 was run in the hole, without the motor, to 2017m MDRT and bedded in to 2019m MDRT when the compensator suddenly dropped spudding the bit with 40klbs. The loss of air in the compensator was investigated and found to be air 'stolen' to pump up guide wire compensators. At the same time a pressure drop was observed on the standpipe pressure gauge, the surface system was pressure tested – no leaks. Pulled string looking for washout, found on middle single, 0.74m below tool joint, of stand #8 off bottom. The single was broken out and replaced and the BHA ran back to bottom.

Drilling resumed at 2019m MDRT and continued to 2057m MDRT when a 4m drilling break was observed, this was flow checked - negative. Samples were circulated to surface for the geologists; maximum gas was 15%. Losses of 20bbls/hr were treated with LCM and drilling continued from 2057m MDRT to 2220m MDRT. Basement confirmed by geologist at 2017m MDRT.

Bottoms up was circulated, and a short wiper trip was undertaken. The hole section from 2196m to 2073m MDRT was backreamed due to excessive overpull/ tight hole. At 2073m the string pulled free, stands were then pulled to 1606m with intermittent overpull of 60+klbs.

After running back to bottom, the EMS survey barrel was dropped and the string pulled out of hole, wiping all tight sections. Flow checks with BHA below 13-3/8" shoe and below BOPs were conducted.

Retrieval of the EMS survey barrel, and downloading of data at surface, gave an inclination of 0.5 deg at 2220m MDRT.

Key Learning/Recommendations

1. *Due to the performance of the heave compensator system maintaining a constant WOB was very difficult. Erratic WOB was seen during the drilling operations and had a negative influence on the ROP. For future drilling projects in this area in this time of the year, consideration should be given to the use of an alternative compensator system or, a more stable drilling unit.*

2. *In spite of above and including occasional stalling/ spudding of the bit and downhole motor, the drilling of the majority of this section with a PDC bit and motor proved very successful. Motor drilling should be recommended in future wells where formations allow and particularly in areas where weather windows are a premium.*

3. *The KCl/PHPA mud system generally worked well, but concentrations of KCl and PHPA need to be closely monitored to ensure sufficient inhibition of the formation to limit the clay dispersion. Cuttings generally looked firm and discreet. Also the low end rheology had to be slightly increased to aid hole cleaning when drilling with fast ROPs through clay sections. When losses were first experienced LCM was added to the active system and the losses were later found to be self healing. When losses occurred again deeper in the hole, the flow rate was slightly cut back and the mud weight was slightly reduced with good success at reducing losses. On future wells, mud weight should be kept to the minimum necessary for stability and well control purposes, and to keep losses to the minimum. A stock of various grades/types of LCM material should be maintained on the rig, with only treatable (acidisable) LCM used in the reservoir section.*

   Stage cementing equipment and external casing packers should be maintained on location in the event that casing requires to be cemented in a hole section where excessive losses are experienced.

4. *Two DP washouts occurred while drilling the 12-1/4" section. They were probably not caused by slip dyes but rather due to corrosion, pitting from inside or flexing (fatigue) around the friction welded area. Oxygen scavenger was added to the mud system to combat corrosion. It is recommended that a higher inspection standard (DS-1, Cat 5) is stipulated in future contracts, and that a pipe re-inspection schedule be incorporated in the program. Also, corrosion rates and mud oxygen scavenger content should be carefully monitored with appropriate action taken as required.*

5. *Poor recovery of the core was almost certainly a function of the poor motion compensator characteristics and human error. When the Rig Superintendent was at the brake and he was not used to the sensitivity of the drawworks/compensator system. As a result very poor core recovery was obtained 8%. In future, during critical operations, only personnel familiar with the systems should be allowed to run equipment.*

9.8. 12-1/4" Electric Logging Operations – Open hole 863m – 2220m MDRT

Several attempts to run in hole with the Schlumberger PEX tool, in various configurations, stood up at 916m and 936m and was unable to pass. Schlumberger were rigged down and a bit picked up for a full wiper trip.

The string stood up at 939m and required to be reamed / washed to 1183m where stands were run until 2149m. The TDS was made up and the bit was reamed washed to bottom. The hole was circulated clean and the string pulled out of hole. Tight hole was experienced from 1350m – 1000m, up to 80klbs overpull. From 100m to 944m the backreaming was required. Due to the excessive tight hole another wiper was run.

The bit was run to 955m where it stood up, it was reamed to 980m. The weather was deteriorating so the bit was pulled back to 765m and the hang off tool was run. Rig repairs were effected while WOW for 9 hours. The hang off tool was retrieved and the string run in to 941m, the TDS was made up and tight hole / bridges were reamed from 925m – 1250m and 1360m – 1412m. Stands were run in to 2157m and the bit was then washed/reamed to bottom.

The hole was circulated clean, with evidence of heavy solids unloading at the shakers. The riser was boosted, the well flow checked – negative and the string was pulled out of hole. Again overpull and backreaming was required in the same intervals as the first wiper trip.

Schlumberger was rigged up and logging attempted but the tool again stood up at 927m and was unable to pass. Logged caliper up from 927m to 863m. Schlumberger was logged down and a third wiper trip was run.

Similar reaming was required at the problem areas, at TD a HiVis HiWt KCl sweep was pumped and circulated out of hole. This blinded the shakers with 12mm clay cavings with occasional 50-90mm pieces up to 150mm deep on the scalping shaker. Hole condition on way out good with no excessive overpull.

Schlumberger was again rigged up and a further attempt to log the hole was made, with the tool standing up at 1048m. On picking up 500lbs overpull was observed, indicating that ledging was not the problem. A further attempt was made with a chain hole finder with no success. It was decided to run casing to above the zone of interest allowing the reservoir section to be logged with the problem areas cased off.

9.9. 9-5/8" Casing

9-5/8" Casing Summary	
Weight / Grade / Connection / Drift	79.6 kg/m / L80 / VAM Ace / special drift
9-5/8" shoe at	1878m MDRT
12-1/4" hole to	2220m MDRT
Casing hanger at	73m MDRT
Burst / Collapse rating	7930 / 6620psi
Pressure test	3000psi

A total of 152 joints of 9-5/8" casing were run and cemented with the float shoe at 1878m MDRT.

Prior to running in the hole the shoe float was checked by draining water through. The first 6 joints of casing were Baker-locked, centralisers were pre-fitted over the first 8 joints of casing as per program and each joint was filled with mud.

Casing was run down to 678m before operations were shut down due to weather, WOW 3.5 hours. A total of 152 joints plus 1 crossover and 1 pup joint were run and the full bore running tool was used. The wellhead joint was made up to the casing hanger and the landing string was run. Harsh weather caused several problems and continuous delays during the running of the landing string and the rigging up of the cement head. With cement head made up casing was landed in wellhead and the cement unit lined up and pressure tested to 3500psi for 10mins.

Half the casing was circulated clean with mud and chemical wash pill was pumped. The bottom plug was released and 16bbls of 1.5sg extended lead cement slurry was pumped before the gate valve on the surge tank froze shut. The lines were pumped clear and the 16bbls of cement were pumped out of the annulus. The gate valve was cleared and a 60bbl chemical wash was pumped.

Mixed and pumped 103bbls of 1.5sg lead slurry followed by 33bbls of 1.9sg slurry. The top plug was released and chased from the cement unit with 10bbls water to chase plug and clear lines. Rig pumps were then used to displace cement with 421bbls of KCl mud, the plugs were bumped with 400psi, the pressure was built up to 3000psi and the casing pressure tested for 10mins. The pressure was bled off and the lines were broken – no backflow. The running tool was backed out of the casing hanger and the landing string was laid out.

The packoff was run, the seal energised and pressure tested against the annulus. BOP's were tested and the wear bushing was run prior to drilling out the cement.

Cement and float equipment was drilled with an 8-1/2" bit and the hole wiped to TD and circulated clean.

Key Learning/Recommendations

1. *The full bore running tool was used as the cement head on board had been intended for use on Yolla-2, which required a full bore running tool due to the string weight. However when string weight is not a problem a normal running tool should be used with a subsea cement head as operations are made slow and difficult when using casing as the running string, as was the case on this well.*

9.10. 12-1/4" Electric Logging Operations – Open hole 1878m – 2220m MDRT

The following wireline logs were run;

1. PEX-GR-CNL was run to 2210m MDRT loggers depth, the well was logged with the PEX from 2210 MDRT to the 9-5/8" shoe at 1868m MDRT. GR-CNL was logged from 2210m MDRT to 1040m MDRT. The PEX-GR-CNL pulled out of hole and laid out.

2. FMS Array Sonic was rigged up but the Array sonic failed during the surface test so it was decided to run BHC sonic. FMS was logged from 2210m MDRT to the 9-5/8" casing shoe and BHC sonic from 2210m MDRT to 1975m MDRT before the cable head failed. The tool was bought to surface and the cable head and tension compression sub was changed out. BHC sonic was then logged back to the 9-5/8" shoe.

3. MDT was rigged up and run in hole, pressure points were taken from 1976m MDRT top down. The tool was pulled after 51 pressure tests and 1 sample to change out a packer element, the MDT was run back in to take the last 2 samples and 3 pressure points. With 1 sample left to take the packer failed again and had to be changed before taking the last sample. Samples were recovered and the tool laid down.

4. CMR-NGT was run with CMR logged from 2158m to 1972m MDRT, and the section 2011m to 2001m MDRT was repeated NGT was logged over the open hole section.

5. After repairing the insulation on the cable head the CST tool was run and 30 sidewall cores were obtained (100% recovery).

6. VSP guns and hydrophones were lowered over the aft port and the VSP air guns were synchronised. The VSP tools were run in the hole to 80m, but had to be recovered to change out the tension/compression sub. The tool was run back in to 1500m and function tested which highlighted that the caliper would not open. The tool was recovered again and the problem investigated/temporarily fixed. Once again the tool was run in and depths were correlated and systems checked. The well was logged at 41 levels. The VSP logging suite was pulled out of the hole and laid down.

7. A back-up Array Sonic tool was delivered to the rig and this was run in hole and logged from TD to 863m.

Key Learning/Recommendations

1. *Several tool failures marred what was already a costly logging job with problems on the cable head, Array Sonic tool, VSP caliper arm and MDT packer elements.*

2. *The additional compensation device used with the wireline logging worked well in considerably large heaves. These should be recommended whenever working from a floating drill rig.*

3. *It was discovered in a meeting after the well was completed that some of the tools used on White Ibis-1 had had a history of poor performace in Australia in recent times. When selecting electric logging tools performance history and support from supplier for that particular tool type should be investigated as often the 'older' tools are less well maintained/serviced.*

9.11. Suspension

The well was suspended by setting one 200m open hole balanced cement plug across the hydrocarbon bearing sands. One 100m balanced cement plug across the 9-5/8" shoe and one balanced cement plug was set near seabed in the 9-5/8" casing.

Plug #1 was set from 2150m to 1950m MDRT, plug #2 was set from 1908m to 1808m MDRT and plug #3 was set from 150m to 105m MDRT.

After finishing spotting plug #1 the well was displaced to corrosion inhibited mud, before plug # 2 was set.

The riser and BOPs were displaced to seawater and the cementing stinger pulled out and laid down. The diverter, was pulled, the slip joint collapsed and secured and the BOP and riser unlatched. After nippling down the kill & choke lines, the slip joint, riser and the BOPs were pulled. The guide wires were disconnected from the BOP and the BOP moved to storage position.

The wear bushing was retrieved with the running/retrieval tool and the utility guide frame and layed out. The same tool was used to run the corrosion cap, once in place and latched the wellhead was displaced with 1 bbl of Stack Magic oil (red colour). The guide lines were cut by the ROV and the running tool retrieved and layed out.

Key Learning/ Recommendations.

1. *All plugs were underdisplaced by 3-4Bbls, this should be advised so as to avoid cement in the drill pipe potentially causing problems.*

2. *Utility guide frame should be available for all wellhead operations when the riser is not in place.*

9.12. Retrieve Anchors

Recovery of secondary anchors commenced during the suspension and the primary anchor operation commenced when the PGB guide wires were cut at 10:45 hrs on the 2nd July 1998.

All anchor recovery operations were completed, without problems, by 00:30 hrs on 3 July 1998, with the rig departing for Geelong to offload prior to demobilisation to Singapore.

10. FORMATION PRESSURE EVALUATION

Computerised mudlogging and engineering data acquisition services were provided by Geoservices. A formation pressure evaluation log and over pressure log were maintained while drilling the well. These logs are enclosed in the Geoservices White Ibis-1 End of Well Report.

10.1. 17-1/2" Hole

The 17-1/2" hole was drilled using seawater and without marine riser in place. All returns were taken to seabed. The corrected 'D' exponent plot shows no overpressure in this hole section.

10.2. 12-1/4" Hole

The 12-1/4" hole was drilled with KCL/PHPA mud and marine riser in place. All returns were taken back across the shakers allowing for mud monitoring (mud weight, temperature, gas, etc.).

This hole section was drilled as a normally pressured well with no hole problems to TD at 2220m MDRT.

The overpressure plot takes into account the hole conditions and provides the most readable form to determine overpressure. Review of the overpressure log shows no major overpressure signs, and no hole problems were encountered while drilling this section to TD.

MDT tests show the formation to be normally pressured, with a maximum pore pressure of 1.0 SG at 2035m MDRT, and drilled with an overbalance of approx 525psi at 2035m MDRT, equating to 0.18 SG overbalance.

TABLE 1

570058

INCIDENT/ACCIDENT LOG

NORTHERN EXPLORER III – BASS STRAITS PROJECT

DATE/ TIME	NAME	DESCRIPTION	CLASS'N	COMMENTS	CLOSED
June 1998					
01/06/98 10:15	B Evans	Roustabout was struck in face after wire recoiled causing laceration to face and lower & upper gums.	MI	Insuficient care being exercised	✓
03/06/98 03:30	I Williams	Pumpman was attempting to dislodge blockage in cement pipe which disloged blowing cement in eyes.	MI	Eye protection not being used – correct PPE to be worn at all times	✓
07/06/98	N/A	Trevelling block was run into crown stopper in high/high (empty blocks). Crown-O-Matic was functioning correctly; incident due to excessive speed combined with inexperience.	Impact	More care required when operator is not fully conversant with equipment.	✓
14/06/98	N/A	While tripping out of hole, top drive hydraulic/air service loop became caught under the dolly track. When the blocks were lifted, the loop parted at the block end	Snagging	Heavy weather was rolling the ship, making hoses move more than normal, also beam on which hose snagged is a blind spot from driller's seated position	✓
19/06/98	N/A	While working alongside to off-load equipment, the support vessel "Brute Tide" collided with the rig several times. In one impact, the rig port diverter line pierced the "Brute Tide" Hill and caused minor damage to the rig.	Impact	It was noted that the Brute Tide master should have aborted his approach when boat bumpers were noticed to be moving out of position. A third fender might have prevented the impact.	✓
21/06/98 17:00	W Shelton	Steward cut left hand on a plate which broke whilst being washed in galley	MI	Rubber gloves were not being worn- correct PPE to be used at all times	✓
21/06/98 3:55	J Miles	Dogman received right hand crush injuries whilst preparing to release shackle for fender painter line. Wave movement caused painter line to suddenly tension, trapping his hand between line and rig side rail.	LTI	First lost time injury of the campaign.	✓

23/06/98 21:00	K Rowley	Small fragments of wire brush became lodged in rating's left hand ring finger whilst buffing engine head	MI	Gloves not being used-correct PPE to be worn at all times	✓
24/06/98 15:00	R Poole	Roughneck tripped whilst trying to avoid casing joint which got loose during rough weather. As he fell over the edge of a walk around, his ankle became caught in the torque gauge hose, leaving him suspended upside down	MI	More hands may be required to handle casing in rough weather	✓
28/06/98 07:00	J Fredricks	Whilst re-attaching compensation line to pad eye on pipe, setback rig heaved, trapping Derrickman's finger between setback and shackle	MTI	More care required during rough weather	✓

570060

INCIDENT/ACCIDENT LOG

NORTHERN EXPLORER III – BASS STRAITS PROJECT

DATE/ TIME	NAME	DESCRIPTION	CLASS'N	COMMENTS	CLOSED
July 1998					
02/07/98 01:30	N/A	Fire in laundry on deck 5 halts operations, found due to tumble drier. Fire controlled/extinguished.	Water leak?	Presently under investigation	

TABLE 2

White Ibis -1

Formation	Depths
Torquay Group	74.4-1430m MD
Demons Bluff	1430 –1577m MD
Top EVCM	1577m MD
Top EVCM Sand	1604m MD
Top Palaeocene	1942m MD
Top EVCM 2002 sand	2002m MD
Top EVCM 2044 sand	2044m MD
Top EVCM 2128 sand	2128m MD
Top Metamorphic basement	2158m MD

570062

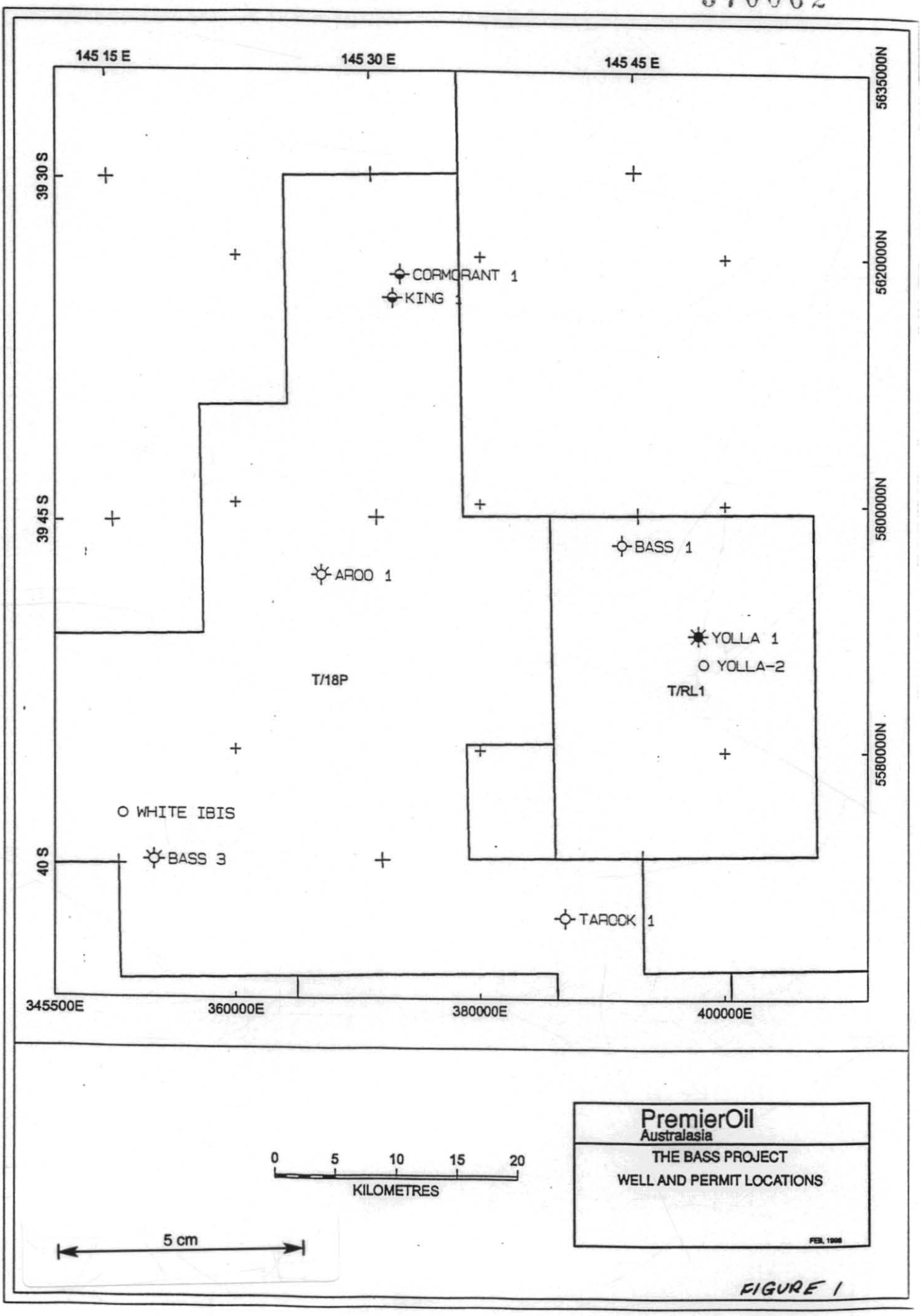
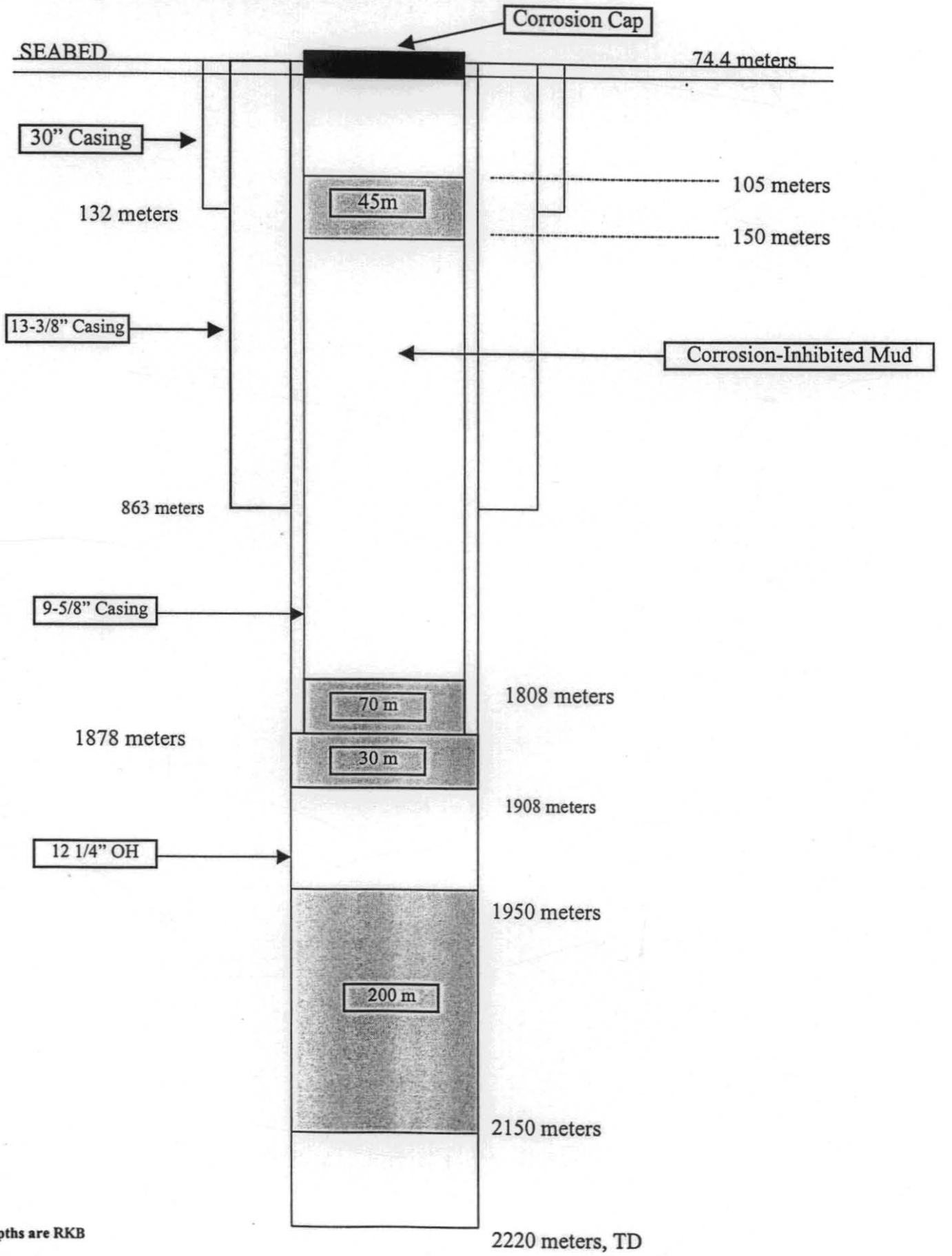


FIGURE 1

570063

White Ibis-1 Well Status After Suspension



** . Depths are RKB

FIGURE 2

TIME BREAKDOWN DATABASE - single well overview

WELL : White Ibis 1

Pacesetter : none selected

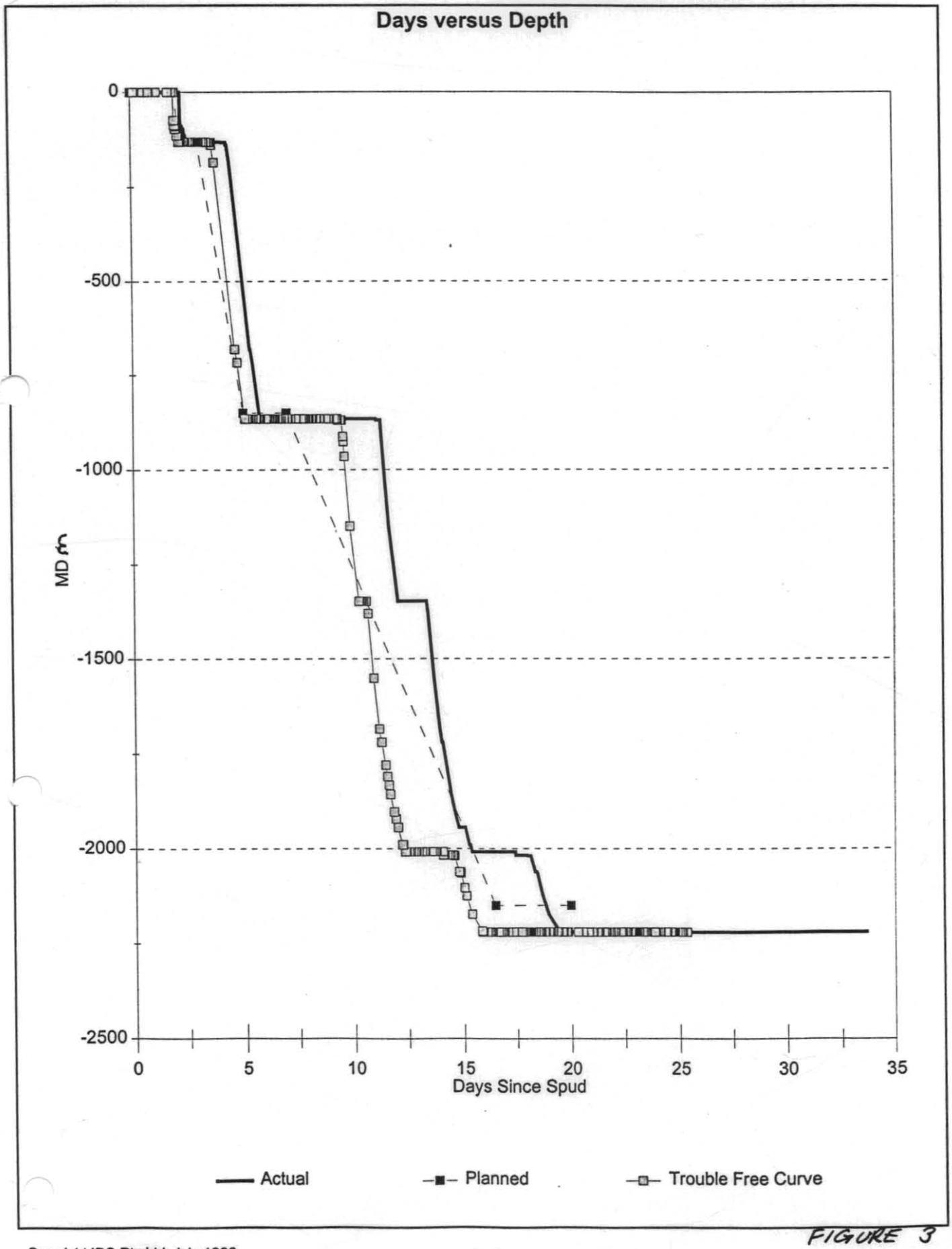


FIGURE 3

Copyright IDS Pty Ltd, July 1998

5 cm

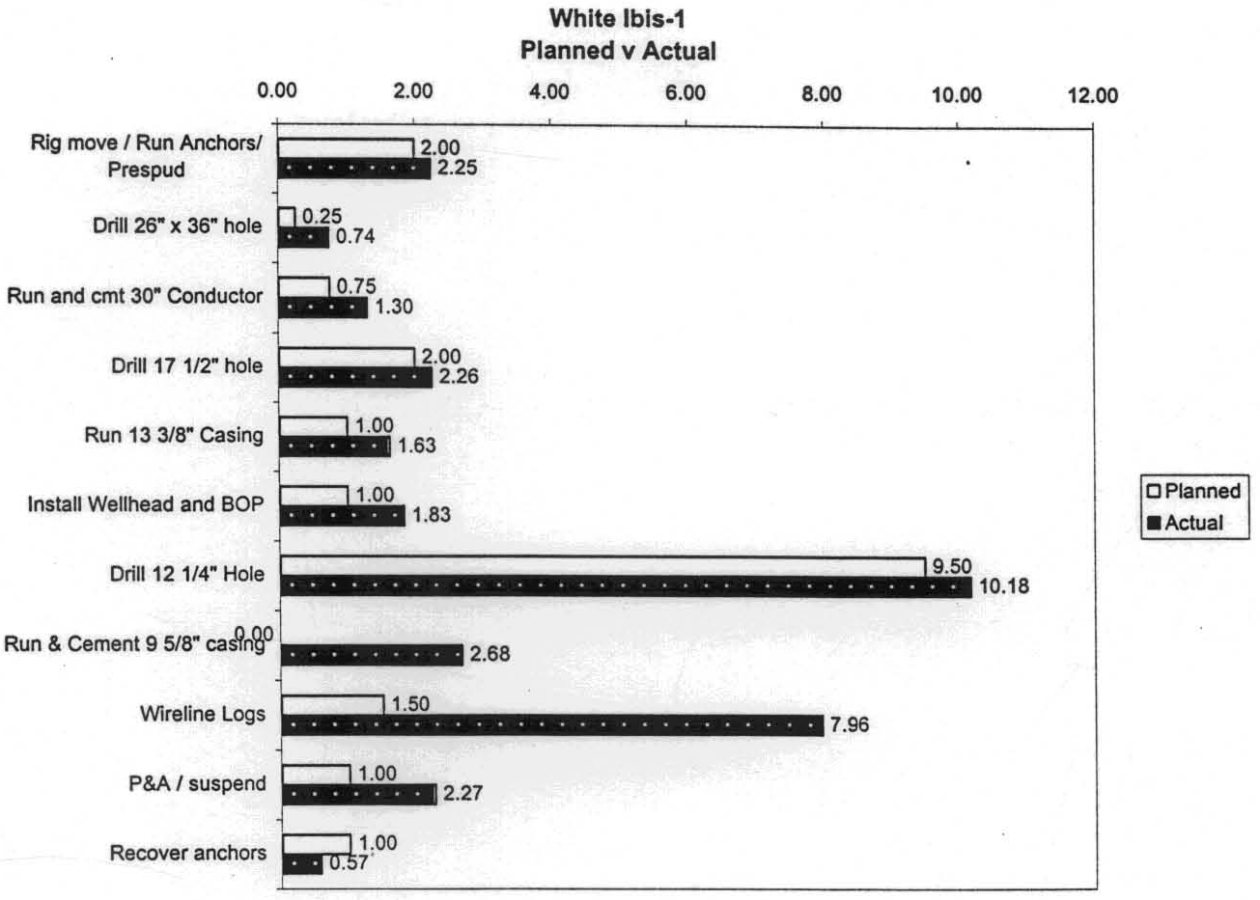
White Ibis-1

Time breakdown

Operation	Time Days	Cumm Days	Depth (m)
Move Rig to location / run anchors	2.25	2.25	0
Spud well drill 36" hole, clean hole	0.74	2.99	132
Run 30" casing and cement	1.30	4.29	132
Drill 17 1/2" hole	2.26	6.55	866
Run 13 3/8" casing & cement	1.63	8.18	866
NU BOP's and test	1.83	10.01	866
Rig up and RIH to drill cement	0.40	10.41	866
Mud pump #1 repair	0.31	10.72	866
Drill out cement & FIT	0.56	11.28	869
Drill 12 1/4" hole with motor	0.94	12.22	1,348
WOW	1.00	13.22	1,348
Drill 12 1/4" hole with motor	1.55	14.77	1,944
Washout	0.31	15.08	1,944
Drill 12 1/4" hole with motor	0.82	15.91	2,008
Rig up and RIH with core barrel, core	1.73	17.64	2,017
Drill 12 1/4" hole	0.40	18.03	2,019
Washout	0.09	18.13	2,019
Drill 12 1/4" hole	2.06	20.19	2,220
Logging - unable to RIH	0.27	20.46	2,220
Wiper Trip	0.90	21.35	2,220
WOW	0.50	21.85	2,220
Wiper Trip	0.77	22.63	2,220
Logging - unable to RIH	0.29	22.92	2,220
Wiper Trip	0.76	23.68	2,220
Logging - unable to RIH	0.45	24.13	2,220
Run 9 5/8" casing & cement	2.33	26.46	2,220
Drill out cement	0.34	26.80	2,220
Wiper Trip	0.33	27.14	2,220
Logging	3.69	30.82	2,220
Suspend	2.27	33.09	2,220
Retrieve anchors	0.57	33.67	2,220

FIGURE 4

570066



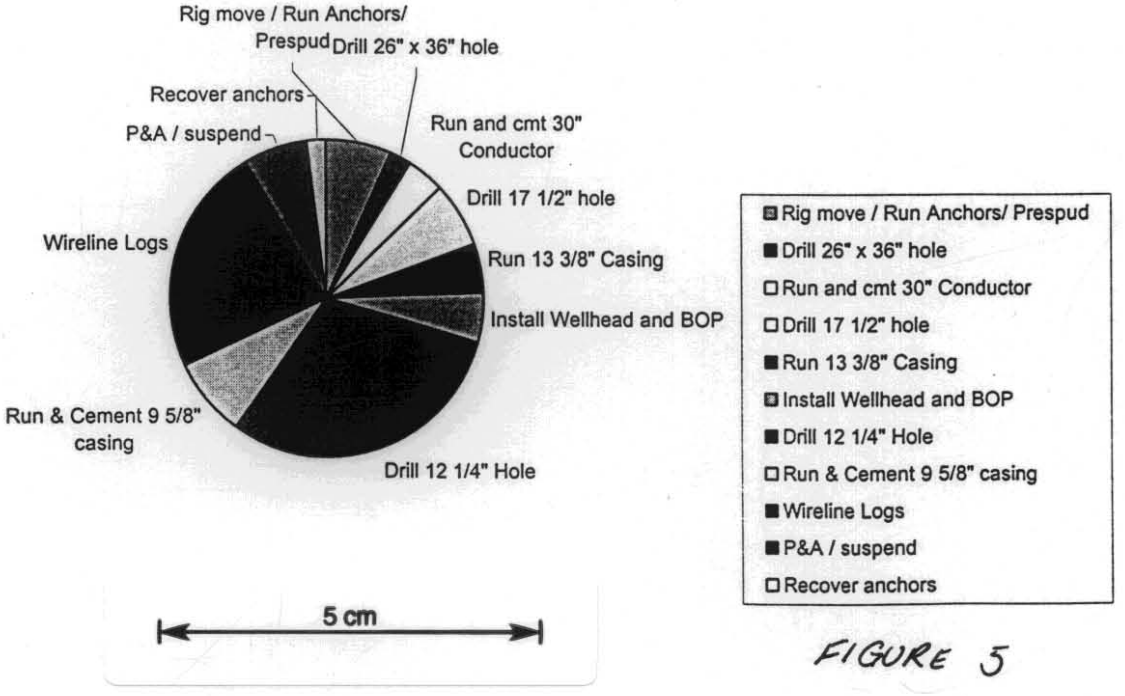


FIGURE 5

APPENDIX I

WELL COST ESTIMATE

570068

LICENCE : T/18P
AREA : BASS STRAITS
WELL: WHITE IBIS-1

0.60 US$=A$
0.40 GBP=1A$

Date
Report No.

	Daily Total / Cumulative Total	35 Forecast Actual US $	20 AFE 832 Total US$	15 Total Under/(Over) US$
A	***SITE PREP / ABANDON.***	**100,220**	**48,750**	**-51,470**
	Site survey - shallow gas	0		0
	Site survey - positioning	42,000		-42,000
	Rig positioning	24,201	16,250	-7,951
	Mooring / riser analysis	34,019		-34,019
	Well abandonment / susp.	0	32,500	32,500
B	***RIG***	**6,336,177**	**4,694,040**	**-1,642,137**
	Rig	6,198,100	4,550,000	-1,648,100
	Supervision	0		0
	Fuel - HFO	0		0
	Fuel - diesel	128,100	131,040	2,940
	Drill & pot water, MT	3,978	13,000	9,023
	Additional accom./catering	6,000		-6,000
C	***CONTRACTOR SERVICES***	**1,854,600**	**541,194**	**-1,313,406**
	Mud logging	46,112	42,350	-3,762
	Mud engineering	25,500	15,000	-10,500
	Cementing	89,075	87,700	-1,375
	Wireline logging	796,712	193,600	-603,112
	Directional surveying incl EMS rent	21,481	24,800	3,319
	Directional drilling	66,710		-66,710
	MWD / LWD	0	0	0
	Coring	40,072	35,978	-4,094
	Solids control	16,931	7,400	-9,531
	Testing	410,000		-410,000
	Casing / liner running	140,838	33,495	-107,343
	Wellhead services	19,313	14,500	-4,813
	ROV	153,608	79,872	-73,736
	Fishing	0		0
	Other contract services	28,250	6,500	-21,750
D	***DRILLING CONSUMABLES***	**405,689**	**439,649**	**33,960**
	Casing Attachments	3,400	22,076	18,676
	Cement & Chemicals	90,065	29,725	-60,340
	Mud chemicals	166,959	157,875	-9,084
	Drill Bits	145,265	229,973	84,708
	Liner Hangers	0		0
E	***WELLHEAD AND CASING***	**413,620**	**192,911**	**-220,709**
	Wellhead	112,787	78,950	-33,837
	30" casing	53,900	26,950	-26,950
	20" casing	0		0
	13-3/8" casing	96,933	74,011	-22,922
	9-5/8" casing	150,000	0	-150,000
	7" casing	0		0
	Casing and wellhead insp.	0	13,000	13,000
F	***TOOLS AND EQUIPMENT***	**130,370**	**31,136**	**-99,233**
	Drilling tools	74,261	31,136	-43,125
	Fishing tools	38,593		-38,593
	Mud shaker screens	0		0
	Turbine drilling equip.	0		0
	Other tools and equipment	17,516		-17,516
G	***TRANSPORT. / COMMS.***	**1,991,917**	**1,316,487**	**-675,430**
	Aircraft	191,730	194,088	2,358

	Supply / Anchor Boats	1,450,275	1,024,145	-426,130
	Road transport. / haulage	95,938	9,854	-86,084
	Couriers	1,000		-1,000
	Communications	30,689	16,250	-14,439
	Port charges	171,650	32,500	-139,150
	Shipping charges	0	32,500	32,500
	Storage charges	8,125	650	-7,475
	Agent fees	42,510	6,500	-36,010
H	***SHOREBASE / YARD***	**82,527**	**13,462**	**-69,065**
	Contract staff	0	0	0
	Office rental	5,437	5,688	251
	Office equipment rental	540	0	-540
	Warehouse rental	0	1,274	1,274
	Yard rental	1,580	0	-1,580
	Cranes / forklift	29,230	0	-29,230
	Base personnel	9,000	0	-9,000
	Travel for contract staff	26,600	3,250	-23,350
	Base accom. / catering	10,140	3,250	-6,890
I	***GEOLOGICAL ANALYSIS***	**52,000**	**52,000**	**0**
	Core analysis	19,500	19,500	0
	Biostratigraphy	0	0	0
	Geochemical	6,500	6,500	0
	VSP Processing	22,750	22,750	0
	Petrography / palynology	3,250	3,250	0
	Sedimentology	0	0	0
	Geological studies	0	0	0
J	***HSE***	**9,500**	**1,690**	**-7,810**
	Oil Spill Contingency Plan	2,000	0	-2,000
	Management Systems	0	0	0
	Emergency Response Plan	7,500	0	-7,500
	Safety / survival equipment	0	0	0
	Oil spill equipment	0	0	0
	Consultants and other	0	1,690	1,690
K	***ADMINISTRATION***	**376,093**	**255,425**	**-120,667**
	Project Management	127,992	92,066	-35,926
	Drilling Supervision	43,451	0	-43,451
	Wellsite geologists	17,412	15,210	-2,202
	Company allocated	118,323	114,149	-4,173
	Contract staff / consultants	62,664	34,000	-28,664
	Travel / subsistence	6,250		-6,250
	Accomodation	0		0
	Taxation	0		0
	Insurance	0		0
	TOTAL US$	**11,752,712**	**7,586,744**	**-4,165,968**
	TOTAL A$	**19587853**	**12644573**	**-6943280**

AFE SUMMARY

SITE PREP / ABANDON.	100,220	48,750	-51,470
RIG	6,336,177	4,694,040	-1,642,137
CONTRACTOR SERVICES	1,854,600	541,194	-1,313,406
DRILLING CONSUMABLES	405,689	439,649	33,960
WELLHEAD AND CASING	413,620	192,911	-220,709
TOOLS AND EQUIPMENT	130,370	31,136	-99,233
TRANSPORT. / COMMS.	1,991,917	1,316,487	-675,430
SHOREBASE / YARD	82,527	13,462	-69,065
GEOLOGICAL ANALYSIS	52,000	52,000	0
HSE	9,500	1,690	-7,810
ADMINISTRATION	376,093	255,425	-120,667
	11,752,712	**7,586,744**	**-4,165,968**
	155%		

APPENDIX 2

WELL SUMMARY

Well History

570071

WELL: White Ibis 1

RIG : Northern Explorer III

#	DATE	DEPTH	WELL HISTORY (24 HR summary)
1	30/05/98		Move to new location. Begin anchor positioning on "Commander" & on "Brute Tide".
2	31/05/98		Transferred anchors to boats - moved rig over wellsite - ran anchors.
3	01/06/98	115	Ran anchors - tension test anchors - spud well.
4	02/06/98	132	Drilled to 132m. Displaced hole to HiVis. POOH to s/bed. W.O. ROV. RIH. Displace hole to HiVis. POOH. RU to run 30". Run & land 30" csg. Circ. P/Test cmt lines. Cement 30" casing.
5	03/06/98	186	Cemented 30" Conductor. MU new BHA w/ 26" bit. RIH. Drill cmt. Drill 1m new hole. POOH. PU new 17 1/2" bit. RIH. Drill 17 1/2" hole.
6	04/06/98	716	Drilled 17 1/2"hole.
7	05/06/98	866	Drilled 17 1/2"hole - circ clean - displace to hi-vis gel - drop EMS - POOH - work tight hole - backream - POOH to shoe - fish EMS - RIH - ream tight hole to bottom - circ clean - displace to hi-vis gel - POOH
8	06/06/98	866	POOH to 30"Housing - jet WH - pull BHA to surface - MU cmt head & layout - MU CART & rack back - RU for csg - JSA - run 13 3/8" csg, land & cement.
9	07/06/98	866	MU DP sgl c/w cmt head to landing string - landed/latched WH - 50K test o/pull - circ csg/ann - test lines - cmt csg - displace cmt (no plug bump) - check zero backflow - release CART - pull/layout CART - l/out BHA -
10	08/06/98	866	Ran BOP & riser. Repaired traveling block brace arm. Jetted PGB & wellhead. Ran Riser. Examined wellhead. MU MRT's.
11	09/06/98	866	Nipple up K+C lines/goosenecks. Align BOP over guideposts. Pump down K+C lines & wash fill from WH/PGB. Land/latch BOP. Stroke Slip Jt. Install Diverter. Test csg & shear rams. Test BOP. MU 12 1/4"BHA. RIH. Tag TOC. Repair pump.
12	10/06/98	965	Pump repairs. Drill shoe track. Drill 3m new 12 1/4"hole. Circ clean. RU & perform FIT. Drill 12 1/4"hole.
13	11/06/98	1,348	Drill 12 1/4" hole. Wiper trip to shoe. PU & set hang-off tool. WOW.
14	12/06/98	1,380	WOW. Retrieve hang-off tool. RIH. Drill 12 1/4" hole.
15	13/06/98	1,857	Drill 12 1/4" hole. TDS service & repair rpm gauge. Drill 12 1/4" hole. String in LCM. Drill 12 1/4" hole.

Copyright IDS Pty Ltd, June 98

WELL: White Ibis 1

#	DATE	DEPTH	WELL HISTORY (24 HR summary)
16	14/06/98	2,008	Drill 12 1/4" hole. Circ BU. POOH for washout. Repair TDS umbilical. POOH for washout (found & replaced). RIH. Drill. Circ BU for samples. Drill. Circ BU for samples.
17	15/06/98	2,008	POOH. L/O BHA & motor. PU core bbl. RIH. Wash/ream tight hole while RIH.
18	16/06/98	2,008	Wash & ream to btm. Circ BU. Drop ball. Cut core. POOH.
19	17/06/98	2,064	POOH w/ core. L/D core bbl. Repair pipe racking system & re-align diverter. MU BHA. RIH. Drill 12 1/4". Circ BU for samples. Drill 12 1/4" hole.
20	18/06/98	2,217	Drilled 12 1/4" hole.
21	19/06/98	2,220	22 std wiper trip. Circ BU. POOH. RIH w/ Schlumberger - won't pass 938m. POOH w/ Schlumberger.
22	20/06/98	2,220	Attempt Schlumberger logs - unsuccessful. RIH. Work tight hole. Wiper trip. Work tight hole. Wait on repairs.
23	21/06/98	2,220	Wait for rig repairs. RIH & retrieve hang off tool. RIH to 941m. Wash & ream as necessary to btm. Circ. POOH for logging.
24	22/06/98	2,220	POOH. RU and attempt to log-unsuccessful. R/D Schlumberger. RIH. Wash & ream as necessary to bottom. Sweep hole. Displace HiVis on btm. POOH.
25	23/06/98	2,220	Circ HiVis sweep. POOH. Attempted Schlumberger logs - unsuccessful. R/D Schlumberger. RU for 9 5/8" csg.
26	24/06/98	2,220	POOH. RU for casing. Run 9 5/8" casing. WOW. Run 9 5/8" casing. Land out casing. RU for cement.
27	25/06/98	2,220	RU for cementing. Circ spacers. Start & abort cement job. Circ out cement. Pump spacers. Cement 9 5/8" csg. R/D rigfloor. Retrieve Hanger running tool. L/O landing string. R/D. Run seal ass'y. Run test plug. Test BOP's.
28	26/06/98	2,220	M/U 8 1/2" drilling assembly, tag TOC, drill out plugs and collar, drill out shoe track and shoe. Clean hole to 2216m, wiping ledge at 2176m. POOH, rig up and RIH with PEX-CNL-GR logs. Log and POOH w/ logging suite #1.
29	27/06/98	2,220	Rig down PEX-CNL-GR. Rig up FMS-Array sonic. Array sonic failed during surface test - replace with BHC sonic module. Log FMS - log BHC sonic up to 1975m - cable head failure. Replace cable head -complete sonic log. Rig up and run MDT logs.
30	28/06/98	2,220	Log MDT - 2 samples taken, POOH to change out packer element, Log MDT - 2 samples & 3 further pressure points, POOH to change out packer element, Log MDT 1 sample(water). POOH Rig down MDT Rig up and RIH with CMR-NGT. Log with CMR-NGT

Copyright IDS Pty Ltd, June 98

WELL: White Ibis 1

#	DATE	DEPTH	WELL HISTORY (24 HR summary)
31	29/06/98	2,220	Complete CMR-NGT logging. Run CST tool - recover 100% of sidewall cores. Rig up and run VSP - after several tool problems. Rig up and RIH with Array Sonic tool. Start Array Sonic logging.
32	30/06/98	2,220	Complete Schlumberger logging and rig down. RIH with 5" cement stinger to TD, circulate hole clean. Set cement plugs #1 & #2. Lay out BHA, drill collars and Hang-Off tool.
33	01/07/98	0	L/D 8" DC's. Run in and tag cement plug #2 at 1824m with 15,000lbs. POOH to 150m laying out excess 5"DP. Set cement plug #3. Flush BOP and riser with seawater. Pull stack and layout slip joint and riser.
34	02/07/98	0	N/D BOP stack and secure in storage position. Retrieve wear bushing, set corrosion cap. Retrieve anchors. Rig off location 00:30hrs 3/7/98.

Copyright IDS Pty Ltd, June 98

570074

APPENDIX 3

BIT RECORD

570075

28/07/98

PremierOil Australasia
White Ibis 1

BIT RECORD

28/07/98

BIT	SIZE	MAKE	TYPE	IADC	SERIAL	TFA	DEPTH	DIST	DRL	TOTAL	ROP	WOB	MOTO	BIT	PUMP	FLOW	HSI	LITHOLOGY	VERT	MUD			DULL GRADE							
N°					N°		OUT	DRLD	HRS	REVS			RPM	RPM	PRESS.	RATE			DEV	TYPE	WT	PV/YP	I	O	D	L	B	G	O	R
						inch²	m	m	hr		m/hr	MT			psi	lt/min			deg		sg									
1RR	26"	HTC	CR-1	1-1-1	B09CH	1.42	132.0	59	5.0	17000	18.0	2-4	-	80	1250	1200	0.1	No Riser	1.5	Gel	1.05	38/94	1	1	NO	A	1	I	NO	TD
1RR2	26"	HTC	CR-1	1-1-1	B09CH	1.42	133.0	1	0.3	1500	4.0	2'5	-	100	1250	1200	0.1	No Riser	1.5	Gel	1.05	38/94	1	1	NO	A	2	I	NO	BHA
2	17 1/2	Reed	Y11	1-1-1	B70452	0.942	866.0	733	32.6	149760	22.5	0-10	-	100	2750	1120	0.0	No Riser	0.0	Gel	1.05	38/94	1	1	NO	A	8	I	NO	TD
3	12 1/4	HTC	BD536HD	3-2-3	1922432	0.959	2008.0	1142	41.8	653000	27.3	0-20	200	270	3200	1000	4.6	Clyst, Siltstn, SST	0.0	PHPA	1.08	13/25	1	2	PN	C	X	1/16	CT-BT	CP
4	12 1/4	Corpro	CM365		775201		2017.0	9	1.0	4000	18.7	8.8			425	250		SST	0.0	PHPA	1.09	13/24			5% wear			1/16		
5	12 1/4	HTC	MAX GT-PS09	4-3-5	X78CH	0.451	2220.0	203	31.0	164000	6.5	20	-	90	3300	700	7.2	Clyst, Siltstn, SST	0.0	PHPA	1.10	13/24	2	1	BT	G3	E	I	CT	TD
5RR	12 1/4	HTC	MAX GT-PS09	4-3-5	X78CH	0.451	2220.0	0		164000					2500	840		Clyst, Siltstn, SST	0.0	PHPA	1.14	15/28	2	1	BT	G3	E	I	CT	LOG
6	8 1/2"	HTC	ATJ G8	3-4-7	V11CL	0.920	2220.0	0		20553					3100	840		CMT	0.0	PHPA	1.16	13/24	2	3	WT	A	E	1	NO	LOG

APPENDIX 4

BHA RECORD

570077

BHA SUMMARY

WELL : White Ibis 1
DRILLING COMPANY : Northern Offshore
RIG : Northern Explorer III

#	LENGTH	WT	WBJAR	STRNG	P/UPWT	S/0FFWT	TQ MAX	TQONBOT	TQ/O/BOT	HRS	BHA DESCRIPTION
1	132.00	110		110	105	110	10,000	4,000	2,000		26"Bit - 36"H/O - Bit Sub c/w float v/v - x/o - 8"Anderdrift - Totco Ring - 9x8"DC - x/o - HWDP.
2	133.00	42	36	42	38	42	10,000	4,000	2,000		26"Bit - NB Stab c/w float v/v - 8"Anderdrift - 8" Pony NMDC - 17 1/2" Stab c/w Totco Ring - 8" NMDC - 17 1/2" Stab - 6x8"DC - jars - 3x8" DC - x/o - 1xHWDP - dart sub - 8 x HWDP.
3	198.38	57	38	165	165	170	10	5	4		17 1/2""Bit - NB Stab c/w float v/v - 8"Anderdrift - 8" Pony NMDC - 17 1/2" Stab c/w Totco Ring - 8" NMDC - 17 1/2" Stab - 6x8"DC - jars - 3x8" DC - x/o - 1xHWDP - dart sub - 8 x HWDP.
4	204.25	62	36	240	232	250	16,000	7,220	3,900		12 1/4"Bit - Bit sub - Motor - x/over - sub - 12 3/16" NB Stab c/w float v/v - 8"Anderdrift c/w Totco Ring- 8" NMDC - 12 3/16" Stab - 6x8"DC - jars - 3x8" DC - x/o - 1xHWDP - dart sub - 8 x HWDP.
5	214.48	59	30	227	220	225	14,000	5,300	2,300		12 1/4" Corehead+8 3/8" core bbl+9 1/2" bumper sub+8" bumper sub+6x8" DC+jar+3x8" DC+x/over+9xHWDP
6	210.43	60	36	253	245	240	11,300	6,900	4,800		12 1/4"Bit - 12 1/4" NB Stab c/w float v/v - 8" NMDC c/w Totco Ring- 12 1/4" Stab -1 x 8" DC - 12 1/4" Stab- 6x8"DC - jars - 3x8" DC - x/o - 9 x HWDP.
7	167.02	31		225			4,350	4,300	3,000		8 1/2" bit, bit sub, 6 x 6 3/4" DC's, 12 x HWDP.

Copyright IDS, March 1997

570078

APPENDIX 5

MUD RECORD

MUD RECAP

WELL : White Ibis 1 **RIG :** Northern Explorer III **TOTAL COST :** $177,462.58

OPERATING CO.: PremierOil Australasia **MUD COMPANY :** Dowell **AVE DAILY COST** $5,545.71

570079

R#	DATE	TYPE	DEPTH	TMP C	MW	VIS	PV	YP	GEL 10s	GEL 10M	F.L. API	CAKE	SOL	%HGS	%LGS	%DS	SND	MBT	PH	PM	PF	CI	HARD /CA	PHPA	KCl%	K+	DAILY $
1	30/05/98																										
3	01/06/98	Gel	74		1.1	150	38	94	57	65									10.0		1	1,400	20				9,406
4	02/06/98	Gel	74		1.1	150	38	94	57	65									10.0		1	1,400	20				9,406
5	03/06/98	Guar Gum	132		1.0	120	19	68	25	26									7.0			19,000	20				5,917
6	04/06/98	Guar Gum	700		1.0	150	21	82	30	30																	7,245
7	05/06/98	Guar Gum	866		1.1	120	23	67	45	52																	15,716
8	06/06/98	Gel	866		1.1	120	23	67	45	52																	0
9	07/06/98	Gel	866		1.1	120	23	67	45	52																	0
10	08/06/98	PHPA	866		1.1	72	14	27	6	7	13.0	1.0	.8	99.2				0.0	9.5	0	0	51,000	120			31,000	12,377
11	09/06/98	PHPA	866		1.1	57	12	23	4	5	14.5	1.0	1.5	98.5				0.0	9.5		0	48,000	140			31,000	11,397
12	10/06/98	PHPA	965		1.1	49	11	21	4	5	10.0	1.0	1.5	98.5				0.0	9.0		0	48,000	200			31,000	7,251
13	11/06/98	PHPA	1,348	105	1.1	50	11	24	5	6	6.4	1.0	1.6	98.4				0.0	9.0	1	0	45,000	481			28,000	9,401
14	12/06/98	PHPA	1,348		1.1	55	11	24	5	6	6.4	1.0	1.6	98.4				0.0	9.0	1	0	45,000	481			28,000	1,380
15	13/06/98	PHPA	1,833	132	1.1	47	13	25	5	7	5.8	1.0	2	98.0			.2	5.0	9.0	1	0	41,000	721		6	31,500	26,839
16	14/06/98	PHPA	1,991	135	1.1	52	15	33	7	10	5.4	1.0	3.5	96.5			.2	6.0	9.0	1	0	41,000	762		6	31,500	30,079
17	15/06/98	PHPA	2,008		1.1	56	15	33	7	11	5.4	1.0	3.5	96.5			.2	0.0	9.0	1	0	42,000	721			31,500	0
18	16/06/98	PHPA	2,008	107	1.1	52	15	33	7	11	5.4	1.0	4.8	95.2			.2	6.0	8.5	0	0	42,000	681		6	31,500	0
19	17/06/98	PHPA	2,049	129	1.1	42	11	21	6	9	5.2	1.0	3.5	96.5			.1	5.0	8.9	1	0	42,000	761		6	31,500	1,866
20	18/06/98	PHPA	2,210	130	1.1	41	11	21	6	10	5.0	1.0	3.9	96.1			.1	5.0	9.0	1	0	43,000	762		6	31,500	6,256
21	19/06/98	PHPA	2,220	132	1.1	41	11	25	6	9	5.0	1.0	3.9	96.1			.1	5.0	8.9	1	0	43,000	802		6	31,500	939
22	20/06/98	PHPA	2,220	130	1.1	45	12	22	6	10	5.2	1.0	3.9	96.1			.1	5.0	9.0	1	0	43,000	761		6	31,500	3,434
23	21/06/98	PHPA	2,220	130	1.1	51	13	24	6	9	4.8	1.0	3.9	96.1			.1	5.0	9.4	1	0	43,000	401		6	31,500	1,926
24	22/06/98	PHPA	2,220	130	1.2	47	18	25	7	12	4.8	1.0	5.5	94.5			.1	6.5	9.3	1	0	43,000	721		6	31,500	6,496
25	23/06/98	PHPA	2,220		1.2	57	16	25	7	12	4.8	1.0	4.4	95.6			.1	5.0	8.8	1	0	43,000	761		6	31,500	6,496
26	24/06/98	PHPA	2,220		1.2	57	16	25	7	12	4.8	1.0	4.4	95.6			.1	5.0	8.8	1	0	43,000	761		6	31,500	0
27	25/06/98	PHPA	2,220		1.2	57	15	24	6	10	5.0	1.0	6	94.0			.1	5.0	9.4	1	0	43,000	882		6	31,500	0
28	26/06/98	PHPA	2,216	43	1.2	48	13	24	6	10	4.8	1.0	6	91.0			.1	5.0	10.5	2	0	43,000	802		6	31,500	1,991
29	27/06/98	PHPA	2,220		1.2	48	13	24	6	10	4.8	1.0	6	91.0			.1	5.0	10.0	2	4	43,000	882		6	31,500	0
30	28/06/98	PHPA	2,220		1.2	52	13	24	6	10	4.8	1.0	6	91.0			.1	5.0	10.0	2	0	43,000	882		6	31,500	0
31	29/06/98	PHPA	2,220		1.2	52	13	24	6	10	4.8	1.0	6	91.0			.1	5.0	10.0	2	0	43,000	882		6	31,500	204
32	30/06/98	PHPA	1,808		1.2	48	14	21	5	8	4.8	1.0	6	91.0			.1	5.0	10.0	2	0	43,000	762		6	31,500	1,442

Copyright IDS, May 98

570080

APPENDIX 6

CASING TALLIES

570081

CASING SUMMARY

WELL : White Ibis 1

DIAMETER : 30 " **L.O.T. :**
CSG SHOE MD : 130.60 **F.I.T. :**
CSG SHOE TVD : 130.60

DESCRIPTION	LENGTH	CSG ID	WEIGHT	GRADE	THREAD
Housing jt	11.82	28.00	310.00	X-52	ST2
Intermediate jt	11.70	28.00	310.00	X-52	ST2
Intermediate jt	11.70	28.00	310.00	X-52	ST2
Intermediate jt	11.70	28.00	310.00	X-52	ST2
Shoe jt	12.38	28.00	310.00	X-52	ST2

DIAMETER : 13.3/8 " **L.O.T. :**
CSG SHOE MD : 863.00 **F.I.T. :** 14.16
CSG SHOE TVD : 863.00

DESCRIPTION	LENGTH	CSG ID	WEIGHT	GRADE	THREAD
1 x Bakerlok jt	11.19	12.42	68.00	L80	N.VAM
20 jts	237.66	12.42	67.00	L80	BTC
3 x Bakerlok jt	35.52	12.42	68.00	L80	N.VAM
40 jts	466.85	12.42	68.00	L80	N.VAM
F/Collar jt	12.34	12.42	68.00	L80	N.VAM
Pup	3.07	12.42	68.00	L80	N.VAM
Shoe jt	12.49	12.42	68.00	L80	N.VAM
Wellhead jt	10.73	12.42	68.00	L80	N.VAM

DIAMETER : 9.5/8 " **L.O.T. :**
CSG SHOE MD : 1,878.00 **F.I.T. :**
CSG SHOE TVD : 1,878.00

DESCRIPTION	LENGTH	CSG ID	WEIGHT	GRADE	THREAD
67jts Casing #107 - #40	801.32	8.54	53.50	L80	VAM Ac
80jts Casing #189 - #109	960.16	8.54	53.50	L80	VAM Ac
Float Collar joint	12.39	8.54	53.50	L80	VAM Ac
Intermediate joint	12.06	8.54	53.50	L80	VAM Ac
Shoe Joint	12.30	8.54	53.50	L80	VAM Ac
Wellhead pup joint	2.80	8.54	53.50	L80	New VA
X/over VAM Ace x New VAM	3.20	8.54	53.50	L80	

Copyright IDS, June 1998

570082

APPENDIX 7

CASING & CEMENTING REPORTS

570083

PremierOil Australasia

CASING AND CEMENTING REPORT

Well : White Ibis 1 — Rig Name : Northern Explorer III

Casing Size (in) :	30" (762mm)	Open Hole Size (in) :	36"	Last Casing Size (in) :	N/A
Shoe Depth (mMD) :	130.6	Drillers Depth (mMD) :	131.97	Shoe Depth (mMD) :	N/A
Shoe Depth (mTVD) :	130.6	Depth (mTVD) :	131.97	Shoe Depth (mTVD) :	N/A

1. CASING RUN IN WELL

Nr. of Joints	Size mm	Weight (ppf)	Grade	Conn.	Centralizers Nr.	Centralizers Spac.	Make up length (m)	Setting Depth (m)	Comments
Shoe	762	310	GR B	ST2	-	-	12.375	130.6	
#2	762	310	GR B	ST2	-	-	11.700	118.8	
#3	762	310	GR B	ST2	-	-	11.700	107.1	
#4	762	310	GR B	ST2	-	-	11.700	95.4	
WH jt	762	310	GR B	ST2	-	-	11.815	83.7	
					-	-	-	-	
					-	-	-	-	
					-		-	-	
					-		-	-	
					-		-	-	
					-		-	-	
							-	-	

2. ELEVATIONS : RKB to

Top of Casing Hanger :	N/A	Top of Csg Head :	71.3	Top of Liner Hanger :	N/A

3. CASING RUN

Check trip after logging (Y or N ?)	N	Mud conditioning						Circulation	
HI-VIS pill before running (Y or N ?)	Y	Weight	1.05	PV	N/A	YP	N/A	Rate (bpm)	7
Nr. of threadlocked joints	0	Filtrate	NC	Gels	N/A			Duration (min)	60

4. CEMENT FORMULATION

Stage	Slurry	Cmt Class	Water and Additives (gps, kg/mt, lt/mt or %)								Slurry Density sg	Yield (ft3/sx)	Thick. Time hr:min
			H20 gps	CaCl2 %BWOC	D 47 gps								
1	Tail	G	5.17	1.5	0.0102	-	-	-	-	-	1.9	1.18	2:00

5. CEMENT PLACEMENT

Stage	Slurry	Volume bbl	Lost bbl	Estimated TOC, m	Pre-calculated TOC, m	Comments
1	Tail	282	0	74.2/seabed	74.2/seabed	Pumped 295 % excess to allow for hole washout, until
						good cement returns confirmed w/ ROV

6. DISPLACEMENT

Stage	Volume bbl	Rate bpm	Lost bbl	Bump Pressure	Test Duration	Floats Hold ?	Comments
1	50.0	7.00	0	N/A	N/A	Y	Float held.

7. REMARKS

Pumped 70bbls S/W flush prior to cementation.

Observed cement at seabed after +/- 200bbls pumped, and good cement returns after +/- 245bbls

CEMENT COMPANY :	Dowell	CEMENTER :	George Adolf/ Dave Patterson
DRILLING ENGINEER :	Kim Dubravac	DRILLING SUPERVISOR :	Charles Stirrett

570084

PremierOil Australasia

CASING AND CEMENTING REPORT

Well : White Ibis 1 — Rig Name : Northern Explorer III

Casing Size (in) :	13 3/8" (340mm)	Open Hole Size (in) :	17 1/2" (445mm)	Last Casing Size (in) :	30" (762mm)
Shoe Depth (mMD) :	863.0	Drillers Depth (mMD) :	866.0	Shoe Depth (mMD) :	133.2
Shoe Depth (mTVD) :	863.0	Depth (mTVD) :	866.0	Shoe Depth (mTVD) :	133.2

1. CASING RUN IN WELL

Nr. of Joints	Size mm	Weight (ppf)	Grade	Conn.	Centralizers Nr.	Centralizers Spac.	Make up length (m)	Setting Depth (m)	Comments
Shoe	340	68	L-80	N.VAM	2	-	12.490	863.0	2 Centralizers on shoe jt
#78	340	68	L-80	N.VAM	2	-	11.043	850.5	2 Centralizers on jt #78
F/C	340	68	L-80	N.VAM	1	-	12.196	839.5	1 Centralizers on F/collar jt
#77-75	340	68	L-80	N.VAM	1	-	35.097	827.3	1 Cent on jts 76, 74, 72, 70, 68 & 66
#74-55	340	67	L-80	BTC	-	-	237.660	792..21	
#53-14	340	68	L-80	N.VAM	-	-	466.850	554.5	
Pup A	340	68	L-80	X/OVER	-	-	3.066	87.7	
WH	476	WH		BTC	-	-	10.730	84.6	
PGB					-		-	73.9	RT to top 30" WH
					-		-	-	Jts Shoe through #75 Bakerloked
					-		-	-	
							-	-	

2. ELEVATIONS : RKB to

Top of Casing Hanger :	N/A	Top of Csg Head :	73	Top of Liner Hanger :	N/A

3. CASING RUN

Check trip after logging (Y or N ?)	N	Mud conditioning						Circulation	
HI-VIS pill before running (Y or N ?)	Y	Weight	1.14	PV	N/A	YP	N/A	Rate (bpm)	11
Nr. of threadlocked joints	5	Filtrate	NC	Gels	N/A			Duration (min)	60

4. CEMENT FORMULATION

Stage	Slurry	Cmt Class	Water and Additives (gps, kg/mt, lt/mt or %)								Slurry Density sg	Yield (ft3/sx)	Thick. Time hr:min
			H20 gps	D075 gps	D 47 gps								
1	Lead	G	14.77	0.5	0.01	-	-	-	-	-	1.44	2.52	5:48
2	Tail	G	5.040	-	0.01	-	-	-	-	-	1.89	1.15	4:25

5. CEMENT PLACEMENT

Stage	Slurry	Volume bbl	Lost bbl	Estimated TOC, m	Pre-calculated TOC, m	Comments
1	Lead	586	0	Seabed (74.4m)	Seabed (74.4m)	Pumped 100 % excess on the open hole volume.
2	Tail	134	0	713	713	

6. DISPLACEMENT

Stage	Volume bbl	Rate bpm	Lost bbl	Bump Pressure	Test Duration	Floats Hold ?	Comments
1	371	20	0	None	N/A	Y	Float held.

7. REMARKS

Cement weights - air & cement feed - good. No problems during mixing or pumping.

Observed pressure 400psi increase after dart released (not the expected 1950psi), and then return to 125psi.

No pressure increase observed while displacing (no bump). Displaced theoretical volume at 93% pump efficency w/o observing bump..

CEMENT COMPANY : Dowell — CEMENTER : Adolf / Patterson

DRILLING ENGINEER : Kim Dubravac — DRILLING SUPERVISOR : Charles Stirrett

570085

PremierOil Australasia

CASING AND CEMENTING REPORT

Well : White Ibis 1 — Rig Name : Northern Explorer III

Casing Size (in) :	9 5/8" (244mm)	Open Hole Size (in) :	12 1/4" (311mm)	Last Casing Size (in) :	13 3/8"(340mm)
Shoe Depth (mMD) :	1878.0	Drillers Depth (mMD) :	1878.0	Shoe Depth (mMD) :	863.0
Shoe Depth (mTVD) :	1878.0	Depth (mTVD) :	1878.0	Shoe Depth (mTVD) :	863.0

1. CASING RUN IN WELL

Nr. of Joints	Size mm	Weight (ppf)	Grade	Conn.	Centralizers Nr.	Centralizers Spac.	Make up length (m)	Setting Depth (m)	Comments
Shoe	244	53.5	L80	VAM Ace	2		12.295	1878.2	2 centralizers on shoe jt
#190	244	53.5	L80	VAM Ace	2		12.062	1865.9	2 centralizers on jt # 190
F/C	244	53.5	L80	VAM Ace	1		12.390	1853.9	1 centralizer on F/C jt
#189-109	244	53.5	L80	VAM Ace	1		960.162	893.1	1 cent on jts 189, 188, 187, 186 & 185
#107-40	244	53.5	L80	VAM Ace			801.323	91.8	
X/over	244	53.5	L80				3.200	80.0	
WH Pup	244	53.5	L80	New VAM			2.800	76.8	
PGB								74.0	RT to top of WH
									Jts shoe thru #187 Bakerloked

2. ELEVATIONS : RKB to

Top of Casing Hanger :	N/A	Top of Csg Head :	73	Top of Liner Hanger :	N/A

3. CASING RUN

Check trip after logging (Y or N ?)	N	Mud conditioning						Circulation	
HI-VIS pill before running (Y or N ?)	Y	Weight	1.16	PV	N/A	YP	N/A	Rate (bpm)	11.9
Nr. of threadlocked joints	6	Filtrate	NC	Gels	N/A			Duration (min)	44

4. CEMENT FORMULATION

Stage	Slurry	Cmt Class	Water and Additives (gps, kg/mt, lt/mt or %) H20 gps	D075 gps	D 47 gps	D110 gps	D603 gps	D604M gps			Slurry Density sg	Yield (ft3/sx)	Thick. Time hr:min
1	Lead	G	12.29	0.42	0.01	0.15	-	-	-	-	1.5	2.2	4:35
2	Tail	G	4.650	-	0.01	0.01	0.2	0.25	-	-	1.89	1.16	3:48

5. CEMENT PLACEMENT

Stage	Slurry	Volume bbl	Lost bbl	Estimated TOC, m	Pre-calculated TOC, m	Comments
1	Lead	103	0		1400	Pumped 50 % excess on the open hole volume.
2	Tail	33	0		1778	Pumped 50 % excess on the open hole volume.

6. DISPLACEMENT

Stage	Volume bbl	Rate bpm	Lost bbl	Bump Pressure	Test Duration	Floats Hold ?	Comments
1	421	8	0	400	10min	Y	Float held.

7. REMARKS

Additive systems computer quitting - batch mixing as necessary

Initial cement job quit after 16bbls pumped due to gate valve on surge tank freezing

CEMENT COMPANY : Dowell — CEMENTER : O'Conner

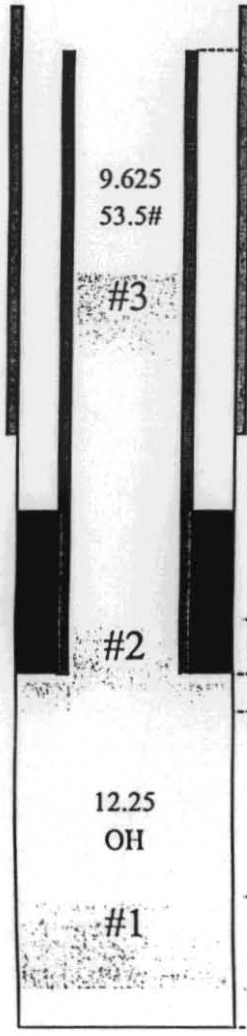
DRILLING ENGINEER : Kim Dubravac / Stuart Harrison — DRILLING SUPERVISOR : Hermann Knobl

Schlumberger Dowell

570080

Date: 30/06/98
Client: Premier
Rig: Northern Explorer 3
Well: White Ibis 1
Job Type: P&A
Supervisor: R. O`Connor

	Plug #1	Plug #2	Plug #3
WA	39.9	15.2	5.0
WB	5.8	5.8	3.0
Disp.	108.0	99.7	0.0



			Height ft	Vol bbl/ft	Excess Factor	Volume bbl
	Sea Bed	75 m 246 ft				
	7 m					
	3 m					
13.375 67.9#		105 m 345 ft				
	45 m		148	0.0708	1.00	10.5
		150 m 492.15 ft				
13 3/8 Shoe		863 m 2831.5 ft				
TOC(from 9 5/8 job)		1400 m				
		1808 m 5932 ft				
9 5/8 Shoe	70 m	1878 m 6162 ft	230	0.0708	1.00	16.3
	30 m	1908 m 6258.24	98	0.1458	1.20	17.2
		ft				
	20% Excess					
		1950 m 6396 ft				
	200 m	2150 m 7052 ft	658	0.1458	1.20	114.8
TD		2220 m 7281.6 ft				

Plug #3 10.5 bbl

Yield = 1.18
Sack = 49.7

Additive	Con	Total Vol	
Sea Water	5.18	6.1	bbl
% CaCl2	1.00	46.8	lbs
D047	0.01	0.5	gal
Tot mix fl	5.19	6.1	bbl

Plug#2 33.5 bbl

Yield = 1.15
Sack = 163.458

Additive	Con	Total Vol	
Drill water	4.96	19.3	bbl
D604M	0.08	13.1	gal
D110	0.03	4.9	gal
D047	0.01	1.6	gal
Tot mix fl	5.08	19.8	bbl

Plug #1 114.8 bbl

Yield = 1.15
Sack = 561

Additive	Con	Total Vol	
Drill water	4.96	66.2	bbl
D604M	0.08	44.8	gal
D110	0.04	22.4	gal
D047	0.01	5.6	gal
Tot mix fl	5.09	67.9	bbl

APPENDIX 8

LOT DATA

570088

28/07/98

PremierOil Australasia

Formation Integrity Report

5 cm

Well Name : White Ibis-1 Rig Name : Northern Explorer III

1. CASING DETAILS:					
Size (in) :	13 3/8"	Weight :	68	Grade :	N. VAM
Shoe depth (m MD) :	863	Shoe depth (m TVD) :	863		
2. OPEN HOLE DETAILS					
Size (in) :	12 1/4"	Depth (m MD) :	866	Depth (m TVD) :	866
Formation Type :	Claystone	Formation Age :	Torquay Grp		
3. MUD DETAILS					
Type :	KCl/PHPA	Density (sg) :	1.07	PV/YP :	11/21
FL :	10.0				
4. TEST PUMP DETAILS					
Type :	Cmt Unit	Contractor :	Dowell	Pump Operator :	Adolf

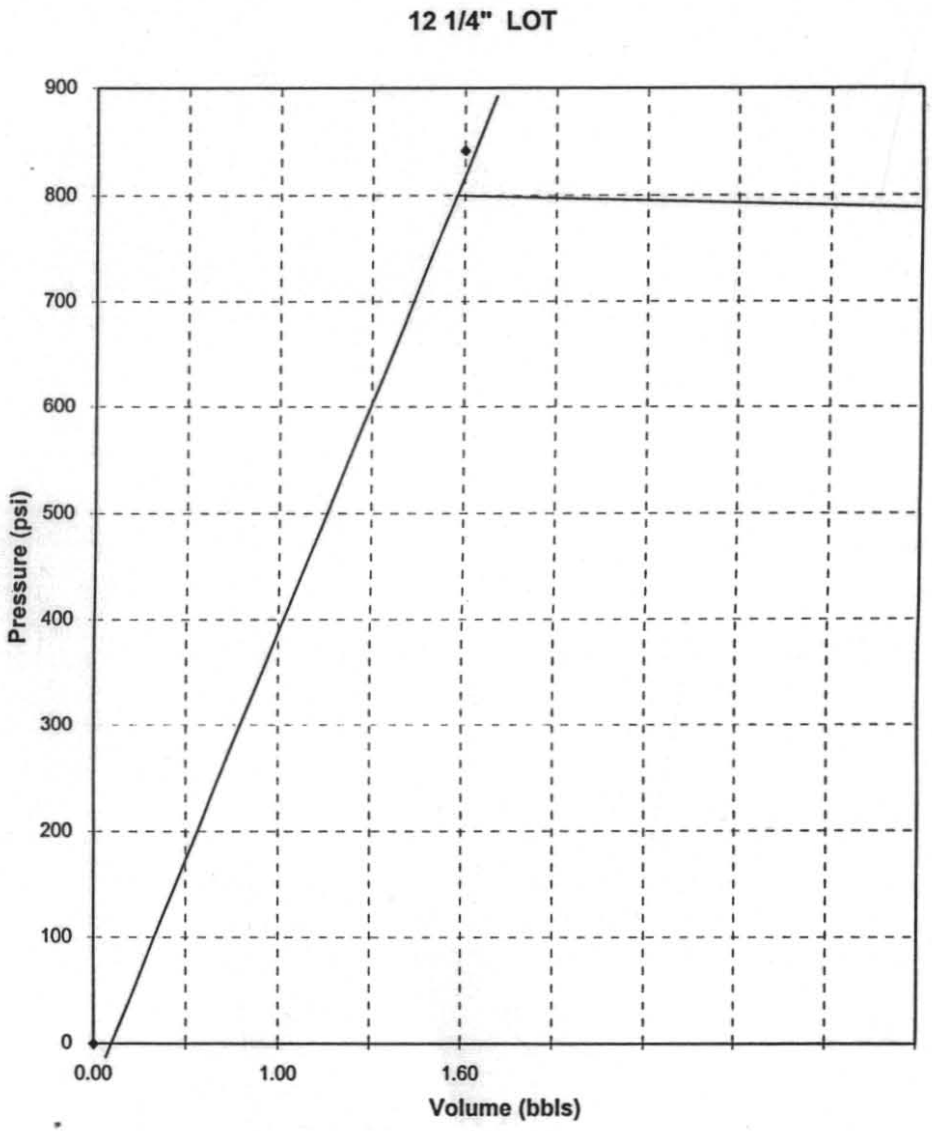
5. TEST DATA

Time (min)	Volume (bbl) Pumped	Volume (bbl) Cumulative	Pressure (psi)
	0.00	0.00	0
	0.50	0.50	
	0.50	1.00	
	0.50	1.50	
	0.10	1.60	842

Time (min)	FALL DOWN		Pressure (psi)
00:00	830.00	803.0	842
1:00			
2:00			
3:00			
4:00			
5:00			800
6:00			
7:00			
8:00			
9:00			
10:00			773

6. DATA ANALYSIS

Total Volume Pumped :	1.6bbls	Maximum Pressure Recorded :		842psi	
Leak off Observed :	No	Leak off Pressure :	N/A	Time Held :	10min
Volume Regained on Bleed Back :	1.6bbls				
Formation Leak off EMW (sg) :	-	Formation Integrity Test EMW (sg) :		1.7sg	



DRILLING SUPERVISOR : H. Knobl DRILLING ENGINEER : K. Dubravac

APPENDIX 9

SURVEY DATA

570090

Deviation Survey

WELL : White Ibis 1

Wellhead Location

LAT.	DEG : 39	MIN : 57	SEC : 49.607
LONG.	DEG : 145	MIN : 15	SEC : 17.234

MD (ft)	TVD1 (ft)	INCL (deg)	AZIMUTH (deg)	CORRECT AZ (deg)	DOGLEG (deg 100ft)	V SECT (m)	N/S	E/W
87.00	87.00	1.25						
107.00	107.00	0.50						
103.00	103.00	1.00						
113.00	113.00	0.00						
125.00	125.00	2.00						
128.00	128.00	1.50						
182.00	182.00	1.00						
193.00	193.00	1.00						
198.00	198.00	1.50						
221.00	221.00	1.50						
250.00	250.00	0.50						
279.00	279.00	1.00						
394.00	394.00	1.00						
451.00	451.00	0.00						
565.00	565.00	1.00						
623.00	623.00	0.00						
652.00	652.00	0.00						
681.00	681.00	0.00						
710.00	710.00	0.00						
739.00	739.00	0.00						
766.00	766.00	0.00						
795.00	795.00	0.00						
823.00	823.00	0.00						
852.00	852.00	0.00						
863.00	863.00	0.00						
890.00	890.00	0.00						
908.00	908.00	0.00						
936.00	936.00	0.00						
963.00	963.00	0.00						
991.00	991.00	0.00						
1,022.00	1,022.00	0.00						
1,050.00	1,050.00	0.00						
1,078.00	1,078.00	0.00						
1,107.00	1,107.00	0.00						
1,136.00	1,136.00	0.00						
1,164.00	1,164.00	0.00						
1,193.00	1,193.00	0.00						
1,222.00	1,222.00	0.00						
1,251.00	1,251.00	0.50						
1,308.00	1,308.00	0.50						
1,362.00	1,362.00	0.50						
1,422.00	1,422.00	0.50						
1,479.00	1,479.00	0.50						
1,594.00	1,594.00	0.00						
1,680.00	1,680.00	0.50						
1,768.00	1,768.00	0.50						
1,852.00	1,852.00	1.00						
1,937.00	1,937.00	0.00						
1,944.00	1,944.00	0.50						

Copyright IDS Pty Ltd, June 1998

APPENDIX 2

CUTTINGS DESCRIPTIONS

WHITE IBIS 1

PREMIER OIL (AUSTRALASIA) LIMITED
WHITE IBIS 1
LITHOLOGIC DESCRIPTIONS & SHOWS

DEPTH (from-to)	%	DESCRIPTIONS & SHOWS
866-870	100	CLAYSTONE: lt gy-v lt gy, calc, sft-frm, sbblky-blky, occ foss frags.
	Tr	LIMESTONE: gy-lt gy brn, arg, frm-hd,tr foss frags, micxln-crypxln, sbblky, no vis por.
		* Heavy cement contamination.
870-875	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
		* Cement contamination
875-880	100	CLAYSTONE: lt gy-v lt gy, med gy i/p, very calc, sft-frm, sblky-blky, com foss frags.
	Tr	LIMESTONE: generally as above, gy-lt gy brn, arg, frm-hd,tr foss frags, micxln-crypxln, sbblky, no vis por
880-885	100	CLAYSTONE: generally as above, v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, tr-min diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ foss frags.
	Tr	LIMESTONE: as above.
885-890	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
		Calcimetry: 22/1
890-900	100	CLAYSTONE: generally as above, gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags.
	Tr	LIMESTONE: generally as above, gy-lt gy brn-yel gy, arg, frm-hd, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por
900-910	100	CLAYSTONE: as above, gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags
	Tr	LIMESTONE: as above
910-920	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
920-930	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
930-940	100	CLAYSTONE: as above, gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags
	Tr	LIMESTONE: generally as above, gy-lt gy brn-yel gy, arg, frm-hd, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por
940-950	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
		Calcimetry: 25/0
950-960	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
960-970	100	CLAYSTONE: gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags
	Tr	LIMESTONE: generally as above, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por
		Calcimetry: 25/1
970-980	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above

980-990	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
990-1000	100	CLAYSTONE: generally as above, gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags
		Calcimetry: 27/1
1000-1010	100	CLAYSTONE: as above
1010-1020	100	CLAYSTONE: generally as above, , gy-lt gy, med gy i/p, calc- v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr-com diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags
	Tr	LIMESTONE: generally as asbove, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por
1020-1030	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1030-1040	100	CLAYSTONE: generally as above, , gy-lt gy, med gy i/p, calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz/lith grns, tr blk spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, occ-com foss frags.
	Tr	LIMESTONE: generally as asbove, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por.
		Calcimetry: 8/0
1040-1050	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
		Calcimetry: 6/0
1050-1060	100	CLAYSTONE: generally as above, , gy-lt gy, med gy i/p, sli-v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, tr blk spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
	Tr	LIMESTONE: generally as asbove, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por.
		Calcimetry: 16/1
1060-1065	100	CLAYSTONE: as above
1065-1070	100	CLAYSTONE: as above
		Calcimetry: 23/1
1070-1075	100	CLAYSTONE: generally as above, , gy-lt gy, med gy i/p, sli-v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, tr blk spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
1075-1080	100	CLAYSTONE: as above
1080-1085	100	CLAYSTONE: as above
	Tr	LIMESTONE: generally as above, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite, no vis por.
1085-1090	100	CLAYSTONE: : generally as above, , gy-lt gy, med gy i/p, sli-v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, tr blk carb spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
	Tr	LIMESTONE: as above
1090-1095	100	CLAYSTONE: as above
	Tr	LIMESTONE: generally as above, occ frm-hd.
1095-1100	100	CLAYSTONE: gy-med lt gy, med gy, pred med gy, sli-v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, tr blk carb spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
	Tr	LIMESTONE: as above

1100-1105	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1105-1110	100	CLAYSTONE: generally as above, gy-med lt gy, med gy, pred med gy, sli-v calc, grades to CALCILUTITE i/p, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, grades to arg SILTSTONE i/p, tr blk carb spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
1110-1115	100	CLAYSTONE: as above
1115-1120	100	CLAYSTONE: as above
1120-1125	100	CLAYSTONE: generally as above, gy-med lt gy, med gy, pred med gy, sli-v calc, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, grades to arg SILTSTONE i/p, tr blk carb spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
1125-1130	100	CLAYSTONE: as above
	Tr	LIMESTONE: generally as above, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite.
1130-1135	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1135-1140	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1140-1145	100	CLAYSTONE: generally as above, gy-med lt gy, med gy, pred med gy, sli-v calc, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, grades to arg SILTSTONE i/p, tr blk carb spks, tr micmic, tr diss pyr, tr pyr nods, blky-sbblky, mass i/p, tr-com foss frags.
	Tr	LIMESTONE: generally as above, off wh-v lt gy-lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, stky i/p, tr foss frags, micxln-crypxln, sbblky, tr calcite.
1145-1150	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1150-1155	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1155-1160	100	CLAYSTONE: generally as above, gy-med lt gy, med gy, pred brn gy, sli-v calc, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, grades to arg SILTSTONE i/p, tr blk carb spks, tr micmic, tr diss pyr, blky-sbblky, mass i/p, tr glauc, tr-com foss frags.
1160-1165	100	CLAYSTONE: as above
	Tr	SANDSTONE: lt gy, transp-transl, vf gn qtz, rnd-sbrnd, w srtd, tr glauc,tr pyr, tr carb spks, strg calc cmt, mod hd-hd aggs, n il vis por, no fluor.
165-1170	100	CLAYSTONE: as above
	Tr	SANDSTONE: as above
1170-1175	100	CLAYSTONE: as above
	Tr	SANDSTONE: as above
1175-1180	100	CLAYSTONE: generally as above, gy-med lt gy, med gy, pred brn gy, sli calc, sft-frm, amorp i/p, slty i/p, tr v f gn qtz grns, grades to arg SILTSTONE i/p, tr blk carb spks, tr micmic, tr diss pyr, blky-sbblky, mass i/p, tr glauc pels, tr foss frags.
	Tr	SANDSTONE: as above
	Tr	LIMESTONE: generally as above, lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, tr foss frags, micxln-crypxln, sbblky.
1180-1185	100	CLAYSTONE: generally as above, lt brn-ly gy, pred brn gy, occ med gy, sft-frm, slty i/p, tr vf gn qtzs, grades to Siltstone i/p, tr carb spks, tr glauc pels, tr red liths, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss.
	Tr	LIMESTONE: as above
1185-1190	100	CLAYSTONE: as above
	Tr	LIMESTONE: as above
1190-1195	100	CLAYSTONE: as above
1195-1200	100	CLAYSTONE: as above

	Tr	SANDSTONE: generally as above, lt gy-clr, transp-transl, vf gn qtz, rnd-sbrnd, w srtd, tr glauc,tr pyr, tr lith frags, tr carb spks, strg calc cmt, tr kaol cmt, mod hd-hd aggs, n il vis por, no fluor.
1200-1205	95	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, occ med gy, sft-frm, slty i/p, tr vf gn qtzs, grades to Siltstone i/p, tr carb spks, tr glauc pels, tr red liths, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss, mass amorp i/p..
	Tr	SANDSTONE: as above
	5	LIMESTONE: generally as above, lt gy brn-yel gy, arg i/p, sli dol, grades to CALCARENITE i/p, sft-frm, tr foss frags, micxln-crypxln, sbblky.
1205-1210	95	CLAYSTONE: as above
	5	LIMESTONE: as above
	Tr	SANDSTONE: as above
1210-1215	85	CLAYSTONE: as above
	10	SANDSTONE: lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, foss frags, tr blk carb spks, pr inf por, no flour.
	5	LIMESTONE: wh-lt gy, sft-frm, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1215-1220	95	CLAYSTONE: as above
	Tr	SANDSTONE: as above
	5	LIMESTONE: as above
1220-1225	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1225-1230	95	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, occ med gy, sft-frm, slty i/p, tr vf gn qtzs, grades to Siltstone i/p, tr carb spks, tr glauc pels, tr red liths, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss, mass amorp i/p.
	5	SANDSTONE: generally as above, lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, foss frags, tr blk carb spks, pr inf por, no flour.
	Tr	LIMESTONE: generally as above, wh-lt gy, sft-frm, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1230-1235	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1235-1240	85	CLAYSTONE: as above
	5	SANDSTONE: as above
	10	LIMESTONE: as above
1240-1245	95	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, occ med gy, sft-frm, slty i/p, tr vf gn qtzs, grades to Siltstone i/p, tr carb spks, tr glauc pels, tr red liths, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss, mass amorp i/p.
	TR	SANDSTONE: generally as above, lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, foss frags, tr blk carb spks, pr inf por, no flour.
	5	LIMESTONE: generally as above, wh-lt gy, sft-frm, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1245-1250	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1250-1255	85	CLAYSTONE: as above
	5	SANDSTONE: as above
	10	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.

1255-1260	90	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, sft-frm, slty i/p, tr vf gn qtzs, tr carb spks, tr glauc pels, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss, mass amorp i/p.
	5	SANDSTONE: generally as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	LIMESTONE: as above
1260-1265	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1265-1270	95	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, sft-frm, mass-amorp i/p, slty i/p, tr vf gn qtzs, tr carb spks, tr glauc pels, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss.
	Tr	SANDSTONE: as above
	5	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1270-1275	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1275-1280	90	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, sft-frm, mass-amorp i/p, slty i/p, tr vf gn qtzs, tr carb spks, tr glauc pels, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss.
	5	SANDSTONE: generally as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1280-1285	85	CLAYSTONE: as above
	5	SANDSTONE: as above
	10	LIMESTONE: as above
1285-1290	90	CLAYSTONE: as above
	Tr	SILTSTONE: lt brn gy-brn wh, mod calc cmt, comm vf grn wl rndqtz, arg i/p, grades to vf grn Sandstone i/p, tr carb spks, tr glauc, r pyr, mod hd-hd, sbblky-blky.
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1290-1295	85	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, sft-frm, mass-amorp i/p, slty i/p, tr vf gn qtzs, tr carb spks, tr glauc pels, tr foss frags, tr diss pyr/nods, micmic, mod calc, sbblky-blky, occ sbfiss.
	Tr	SILTSTONE: as above
	10	SANDSTONE: generally as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1295-1300	90	CLAYSTONE: as above
	Tr	SILTSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1300-1305	90	CLAYSTONE: as above
	Tr	SILTSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above

1305-1310	85	CLAYSTONE: generally as above, lt brn-lt gy, pred brn gy, sft-frm, mass-amorp i/p, slty i/p, tr vf gn qtzs, tr carb spks, tr glauc, tr foss frags, tr diss pyr, micmic, mod calc, sbblky-blky, occ sbfiss.
	5	SANDSTONE: generally as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	SILTSTONE: generally as above, lt brn gy-brn wh, mod calc cmt, comm vf grn wl rndqtz, arg i/p, grades to vf grn Sandstone i/p, tr carb spks, tr glauc, r pyr, mod hd-hd, sbblky-blky.
	5	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1310-1315	85	CLAYSTONE: as above
	10	SILTSTONE: as above
	Tr	SANDSTONE: as above
	5	LIMESTONE: as above
1315-1320	70	CLAYSTONE: as above
	20	SILTSTONE: as above
	5	SANDSTONE: as above
	5	LIMESTONE: as above
1320-1325	65	CLAYSTONE: as above, lt brn-lt gy, pred brn gy, sft-frm, mass-amorp i/p, tr vf gn qtzs, tr carb spks, tr glauc, tr foss frags, tr diss pyr, micmic, sli-mod calc, sbblky-blky, occ sbfiss.
	25	SILTSTONE: as above, lt brn gy-brn wh, mod calc cmt, comm vf grn qtz, arg i/p, grades to vf grn Sandstone i/p, tr carb spks, tr glauc, tr pyr, mod hd-hd, sbblky-blky.
	5	SANDSTONE: as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	LIMESTONE: as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1325-1330	55	CLAYSTONE: as above
	30	SILTSTONE: as above
	5	SANDSTONE: as above
	10	LIMESTONE: as above
1330-1335	60	CLAYSTONE: lt brn gy-lt brn-lt gy, occ med gy, mod calc, com slty, i/p, tr pyr, tr micmic, tr carb spks, t-r foss frags, sft-frm, sbblky-blky.
	30	SILTSTONE: med brn-med gy-med dk brn gy, com micmic, vf gn qtz,tr diss pyr, sli-mod calc, com cly mtx, sft-com frm, sbblky-blky.
	Tr	SANDSTONE: as above
	5	LIMESTONE: as above
1335-1340	55	CLAYSTONE: as above
	40	SILTSTONE: as above
	Tr	SANDSTONE: as above
	5	LIMESTONE: as above
1340-1345	55	CLAYSTONE: as above, lt brn gy-lt brn-lt gy, occ med gy, mod calc, com slty, i/p, tr pyr, tr micmic, tr carb spks, t-r foss frags, sft-frm, sbblky-blky.
	40	SILTSTONE: generally as abovemed brn-med gy-med dk brn gy, com micmic, vf gn qtz,tr diss pyr, sli-mod calc, com cly mtx, sft-com frm, sbblky-blky.
	Tr	SANDSTONE: generally as above, off wh-lt gy-lt brn, vf-f grn, sbang-sbrnd, mod wl srtd, mod hd calc cmt, tr kaol mtx, tr pyr, tr glauc, tr blk carb spks, pr vis por, no flour.
	5	LIMESTONE: generally as above, wh-lt gy-yel gy, sft-frm, occ hd-v hd, sbblky-blky, micxln-cryptxln, arg i/p, grades to Dolomite i/p.
1345-1349	50	CLAYSTONE: as above
	50	SILTSTONE: as above
	Tr	SANDSTONE: as above
	Tr	LIMESTONE: as above
1349-1355	60	CLAYSTONE: as above

	40	SILTSTONE: as above
1355-1360	50	CLAYSTONE: generally as above, lt brn gy-lt brn-lt gy, occ med gy, mod calc, com slty, i/p, tr pyr, tr micmic, tr carb spks, t-r foss frags, sft-frm, sbblky-blky.
	50	SILTSTONE: generally as above, med brn-med gy-med dk brn gy, tr-com micmic, vf gn qtz,tr diss pyr, sli-mod calc, com cly mtx, sft-com frm, sbblky-blky.
1360-1365	40	CLAYSTONE: as above
	60	SILTSTONE: as above
1365-1370	50	CLAYSTONE: as above
	50	SILTSTONE: as above
1370-1375	50	CLAYSTONE: generally as above, lt brn gy-lt gy-dk gy, mod calc, com slty, i/p, tr pyr, tr micmic, tr carb spks, tr foss frags, sft-frm, sbblky-blky, occ sbfiss..
	50	SILTSTONE: generally as above, grn gy-med gy-med dk brn gy, tr-com micmic, vf gn qtz,tr diss pyr, sli-non calc, com cly mtx, sft-com frm, sbblky-blky.
1375-1380	50	CLAYSTONE: as above
	50	SILTSTONE: as above
1380-1385	60	CLAYSTONE: as above
	40	SILTSTONE: as above
	Tr	DOLOMITE: med brn-dk yel brn, occ pl yel brn, crypxln-micxln, occ suc waxy text, tr vf qtz, tr glauc, arg i/p, hd-v hd.
1385-1390	60	CLAYSTONE: as above
	40	SILTSTONE: as above
	Tr	DOLOMITE: as above
1390-1395	60	CLAYSTONE: generally as above, brn gy-lt gy-dk gy, sli calc, com slty i/p, tr pyr, tr micmic, tr carb spks, tr foss frags, sft-frm, sbblky-blky, occ sbfiss.
	40	SILTSTONE: generally as above, grn gy-med gy-med dk brn gy, tr-com micmic, vf gn qtz,tr diss pyr, sli-non calc, com cly mtx, sft-com frm, sbblky-blky.
	Tr	DOLOMITE: generally as above, med brn-dk yel brn, occ pl yel brn, crypxln-micxln, occ suc waxy text, tr vf qtz, tr glauc, arg i/p, hd-v hd.
1395-1400	70	CLAYSTONE: as above
	30	SILTSTONE: as above
	Tr	DOLOMITE: as above
1400-1405	60	CLAYSTONE: as above
	30	SILTSTONE: as above
	Tr	DOLOMITE: as above
1405-1410	40	CLAYSTONE: generally as above, brn gy-lt brn gy-med gy-dk gy, sli calc, com slty, tr micmic, tr carb spks, sft-frm, sbblky-blky, occ sbfiss.
	60	SILTSTONE: generally as above, pl brn-dk brn-med dk brn gy, occ off wh-lt gy, sli-non calc, tr micmic, tr foss gfrags, r diss pyr, frm-mod hd,sbblky-blky, grades to Claystone i/p.
	Tr	DOLOMITE: as above
1410-1415	40	CLAYSTONE: as above
	60	SILTSTONE: as above
	Tr	DOLOMITE: as above
1415-1420	40	CLAYSTONE: as above
	60	SILTSTONE: as above
	Tr	DOLOMITE: as above
1420-1425	40	CLAYSTONE: generally as above, brn gy-lt brn gy-med gy-dk gy, sli calc, com slty, tr micmic, tr carb spks, sft-frm, sbblky-blky, occ sbfiss
	60	SILTSTONE: generally as above, pl brn-dk brn-med dk brn gy, occ off wh-lt gy, sli-non calc, tr micmic, tr foss gfrags, r diss pyr, frm-mod hd,sbblky-blky, grades to Claystone i/p.

	Tr	DOLOMITE: generally as above, med brn-dk yel brn, occ pl yel brn, crypxln-micxln, tr vf qtz, tr glauc, arg i/p, hd-v hd.
1425-1430	40	CLAYSTONE: as above
	60	SILTSTONE: as above
	Tr	DOLOMITE: as above
1430-1435	50	CLAYSTONE: gy brn-dk yel brn-mod brn, sli calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, sft-frm, sbblky-blky, occ disp-washable.
	50	SILTSTONE: gy brn-med brn, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
	Tr	DOLOMITE: as above
1435-1440	50	CLAYSTONE: as above
	50	SILTSTONE: as above
	Tr	DOLOMITE: as above
1440-1450	60	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, sli calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, sft-frm, sbblky-blky, occ disp-washable.
	40	SILTSTONE: as above, gy brn-med brn, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
	Tr	DOLOMITE: as above
1450-1455	60	CLAYSTONE: as above
	40	SILTSTONE: as above
	Tr	DOLOMITE: as above
1455-1460	60	CLAYSTONE: as above
	40	SILTSTONE: as above
	Tr	DOLOMITE: as above
1460-1470	60	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, sli calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, sft-frm, sbblky-blky, occ disp-washable.
	40	SILTSTONE: as above, gy brn-med brn, occ lt blu gy, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
	Tr	DOLOMITE: generally as above, med brn-dk yel brn, occ pl yel brn, crypxln-micxln, tr vf qtz, tr glauc, arg i/p, hd-v hd.
1470-1480	70	CLAYSTONE: as above
	30	SILTSTONE: as above
1480-1485	70	CLAYSTONE: as above
	30	SILTSTONE: as above
1485-1490	70	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, sli calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, sft-frm, sbblky-blky, occ disp-washable.
	30	SILTSTONE: as above, gy brn-med brn, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
1490-1495	70	CLAYSTONE: as above
	30	SILTSTONE: as above
	Tr	SANDSTONE: pl lt gr gy-lt gy, vf-f grn, mod gd spher, sbang-sbrnd, mod wl srtd, tr glauc, tr carb spks, tr wk calc cmt,mod hd fria aggs, pr inf pro, no fluor.
1495-1500	70	CLAYSTONE: as above
	30	SILTSTONE: as above
	Tr	SANDSTONE: as above
1500-1510	70	CLAYSTONE: as above
	30	SILTSTONE: as above
	Tr	SANDSTONE: as above

1510-1515	70	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non-sli calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, sft-frm, sbblky-blky, occ disp-washable.
	30	SILTSTONE: as above, gy brn-med brn, non calc, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
	Tr	SANDSTONE: as above, pl lt gr gy-lt gy, vf-f grn, mod gd spher, sbang-sbrnd, mod wl srtd, tr glauc, tr carb spks, tr wk calc cmt,mod hd fria aggs, pr inf pro, no fluor.
1515-1520	80	CLAYSTONE: as above
	20	SILTSTONE: as above
1520-1525	80	CLAYSTONE: as above
	20	SILTSTONE: as above
1525-1530	80	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	20	SILTSTONE: as above, gy brn-med brn, occ brn blk, non calc, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
1530-1535	85	CLAYSTONE: as above
	15	SILTSTONE: as above
1535-1540	80	CLAYSTONE: as above
	20	SILTSTONE: as above
1540-1545	50	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	45	SILTSTONE: as above, gy brn-med brn, occ brn blk, non calc, arg i/p,comm vf qtz, tr glauc, tr micmic, tr diss pyr, tr pyr nods, tr foss frags, mod hd-frm, sbblky-blky, occ sbfiss.
	5	DOLOMITE: lt brn-med brn, occ sft,blky, microxln, slty, tr vf grn qtz, dul yel min fluor, no cut fluor.
1545-1550	60	SILTSTONE: generally as above, brn-mod yel brn, occ mod dk gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky.
	30	CLAYSTONE: generally as above.
	5	SANDSTONE: mod brn, occ brn gy, vf-f grn, pred vf grn, sbang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, pr vis por, no fluor.
	5	DOLOMITE: generally as above.
1550-1555	70	SILTSTONE: as above
	20	CLAYSTONE: as asbove
	5	SANDSTONE: as above
	5	DOLOMITE: as above
1555-1560	70	SILTSTONE: generally as above, brn-mod yel brn, occ mod dk gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky
	15	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	10	SANDSTONE: as above, mod brn, occ brn gy, vf-f grn, pred vf grn, sbang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, pr vis por, no fluor.
	5	DOLOMITE: as above, lt brn-med brn, occ sft,blky, microxln, slty, tr vf grn qtz, dul yel min fluor, no cut fluor.
1560-1565	85	SILTSTONE: as above
	10	CLAYSTONE: as asbove
	5	SANDSTONE: as above
	Tr	DOLOMITE: as above
1565-1570	85	SILTSTONE: as above
	10	CLAYSTONE: as asbove
	5	SANDSTONE: as above
	Tr	DOLOMITE: as above

1570-1575	75	SILTSTONE: as above, brn-mod yel brn, occ mod dk gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky
	15	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	5	LIMESTONE: wh-lt gy, micxln-cryptxln, tr arg, sndy i/p,sft-frm, grades to Dolomite i/p,sbblky-blky.
	5	SANDSTONE: as above, mod brn, occ brn gy, vf-f grn, pred vf grn, sbang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, pr vis por, no fluor.
	Tr	DOLOMITE: as above
1575-1580	80	SILTSTONE: as above
	20	CLAYSTONE: as above
	Tr	SANDSTONE: as asbove
	Tr	LIMESTONE: as above
1580-1585	75	SILTSTONE: as above, lt brn-brn-mod yel brn, occ mod dk brn gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky
	20	CLAYSTONE: as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	5	SANDSTONE: as above, mod brn, occ brn gy, vf-f grn, pred vf grn, sbang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, pr vis por, no fluor.
	Tr	LIMESTONE: as above
1585-1590	70	SILTSTONE: as above
	15	CLAYSTONE: as above
	5	SANDSTONE: as asbove
	10	LIMESTONE: as above
1590-1595	70	SILTSTONE: as above
	20	CLAYSTONE: as above
	5	SANDSTONE: as asbove
		LIMESTONE: as above
	5	LIMESTONE: as above
1595-1600	50	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	40	SILTSTONE: as above, lt brn-brn-mod yel brn, occ mod dk brn gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky
	10	SANDSTONE: clr-lt gy, transp-transl, vf-f grn, pred vf grn, occ med grn, ang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, lse disaggs, pr vis por, no fluor.
	Tr	LIMESTONE: as above.
1600-1605	50	CLAYSTONE: as above
	40	SILTSTONE: as above
	10	SANDSTONE: as above
	Tr	LIMESTONE: as above
1605-1610	60	SANDSTONE: generally as above, clr-lt gy, transp-transl, vf-f grn, pred vf grn, occ med grn, ang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, lse disaggs, pr vis por, no fluor.
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
1616-1615	80	SANDSTONE: as above
	10	CLAYSTONE: as above
	10	SILTSTONE: as above

1615-1620	80	SANDSTONE: as above, clr-lt gy, transp-transl, occ c mlky qtz grns, vf-f grn, pred vf grn, occ med grn, ang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, lse disaggs, pr vis por, no fluor.
	10	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	10	SILTSTONE: as above, lt brn-brn-mod yel brn, occ mod dk brn gy,comm micmic, tr pyr, tr cly mtx,tr carb spks, sft-frm, sli calc,sbblky-blky
1620-1625	75	SANDSTONE: as above
	10	SILTSTONE: as above.
	15	CLAYSTONE: as above
	Tr	DOLOMITE: lt brn-med brn-yel brn, occ sft,blky, microxln, slty, tr vf grn qtz, dul yel min fluor, no cut fluor.
1625-1630	70	SANDSTONE: as above
	25	SILTSTONE: as above.
	5	CLAYSTONE: as above
1630-1635	70	SANDSTONE: as above
	25	SILTSTONE: as above.
	5	CLAYSTONE: as above
1635-1640	75	SILTSTONE: lt brn-brn-mod yel brn, occ mod dk brn gy, non calc, comm micmic, tr pyr, tr cly mtx,tr carb spks, tr foss frags, sft-frm, sli calc,sbblky-blky
	20	SANDSTONE: as above, occ c-vc grn, pred c.
	5	CLAYSTONE: as above
1640-1645	80	SILTSTONE: as above
	15	SANDSTONE: as above
	5	CLAYSTONE: as above
1645-1650	40	SILTSTONE: lt brn-brn-mod yel brn, occ mod dk brn gy, non calc, comm micmic, tr pyr, tr cly mtx,tr carb spks, tr foss frags, sft-frm, sli calc,sbblky-blky.
	40	CLAYSTONE: generally as above, gy brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	20	SANDSTONE: as above, clr-lt gy, transp-transl, occ c mlky qtz grns, f-c grn, pred c grn, ang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, lse disaggs, pr vis por, no fluor.
1650-1655	45	SILTSTONE: as above.
	35	CLAYSTONE: as above
	20	SANDSTONE: as above
1655-1660	60	CLAYSTONE: gy brn-pl yel brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr carb spks, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable.
	25	SILTSTONE: generally as above, lt brn-brn-mod yel brn, occ mod dk brn gy, non calc, comm micmic, tr pyr, tr cly mtx,tr carb spks, tr foss frags, sft-frm, sli calc,sbblky-blky.
	15	SANDSTONE: as above, clr-lt gy, transl, occ c mlky qtz grns, f-c grn, occ vc grn, pred c grn, ang-sbrnd, mod wl srtd, tr micmic, tr dis pyr, comm carb mat, tr liths, tr glauc, dol cmt, wk arg mtx, fri-hd, lse disaggs, pr vis por, no fluor
1660-1665	70	CLAYSTONE: as above
	20	SILTSTONE: as above.
	10	SANDSTONE: as above
1665-1670	60	CLAYSTONE: as above
	40	SILTSTONE: as above.
	Tr	SANDSTONE: as above

1670-1675	60	CLAYSTONE: gy brn-pl yel brn-dk yel brn-mod brn, non calc, slty, tr vf gn qtz, tr carb spks, tr micmic, comm diss pyr, tr glauc, tr-com foss frags, sft-frm, sbblky-blky, occ disp-washable
	40	SILTSTONE: generally as above, lt brn-brn-mod yel brn, occ mod dk brn gy, non calc, comm micmic, tr pyr, tr cly mtx,tr carb spks, tr foss frags, sft-frm, sli calc,sbblky-blky
1675-1680	50	CLAYSTONE: as above
	50	SILTSTONE: as above.
1680-1685	60	CLAYSTONE: lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp.
	40	SILTSTONE: generally as above, lt brn-brn-mod yel brn, occ mod dk brn gy, non calc, comm micmic, tr pyr, tr cly mtx,tr carb spks, tr foss frags, sft-frm, sli calc,sbblky-blky
1685-1690	75	CLAYSTONE: as above
	20	SILTSTONE: as above.
	5	SANDSTONE: lt gy-occ yel brn,vf-f grn, occ c grn, com micmic, tr-com pyr, tr red lith frags, sbang-sbrnd, mod wl srtd, tr glauc, wl cons w/ kao mtx, calc cmt, pr vis por, no fluor.
1690-1695	80	CLAYSTONE: as above
	15	SILTSTONE: as above.
	5	SANDSTONE: as above
1695-1700	90	CLAYSTONE: as above, lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp.
	5	SILTSTONE: as above.
	5	SANDSTONE: as above
1700-1705	85	CLAYSTONE: as above
	5	SILTSTONE: as above.
	10	SANDSTONE: as above
1705-1710	70	CLAYSTONE: as above, lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp.
	Tr	SILTSTONE: as above.
	30	SANDSTONE: as above, clr-lt gy-occ yel brn,vf-f grn, occ c grn, com micmic, tr-com pyr, tr red lith frags, sbang-sbrnd, occ ang, pr- mod wl srtd, tr glauc, aggs wl cons w/ kao mtx, calc cmt, pr vis por, no fluor.
1710-1715	75	CLAYSTONE: as above
	Tr	SILTSTONE: as above.
	25	SANDSTONE: as above
1715-1720	50	SHALE: gy-grn gy, occ lt blu gy, com micmic, com pyr, tr vf grn qtz slt i/p, rr carb spks, frm-sli hd, mod calc, sbblky-fiss, occ lams.
	35	CLAYSTONE: as above
	15	SANDSTONE: as above
	Tr	SILTSTONE: as above
1720-1725	20	SHALE: as above
	60	CLAYSTONE: as above
	20	SANDSTONE: as above
1725-1730	10	SHALE: as above, gy-grn gy, occ lt blu gy, com micmic, com pyr, tr vf grn qtz slt i/p, rr carb spks, frm-sli hd, mod calc, sbblky-fiss, occ lams
	70	CLAYSTONE: as above, lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp.
	20	SANDSTONE: as above, clr-lt gy-occ yel brn,vf-f grn, occ c grn, com micmic, tr-com pyr, tr red lith frags, sbang-sbrnd, occ ang, pr- mod wl srtd, tr glauc, aggs wl cons w/ kao mtx, calc cmt, pr vis por, no fluor.
1730-1735	80	SANDSTONE: as above

	15	SILTSTONE: dk brn-brn blk, w/ blk carbonaceous lams, grades to Coal i/p, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky.
	5	CLAYSTONE: as above
1735-1740	90	SANDSTONE: as above
	5	CLAYSTONE: as above
	5	SHALE: generally as above, gy-grn gy, occ lt blu gy, com micmic, com pyr, tr vf grn qtz slt i/p, rr carb spks, frm-sli hd, mod calc, sbblky-fiss, occ lams
	Tr	SILTSTONE: as above
1740-1745	95	SANDSTONE: generally as above, clr-lt gy, vf-m grn, occ c grn,pred med grn, com micmic, tr mica flakes, tr-com pyr, tr red lith frags, sbang-sbrnd, occ ang, pr- mod wl srtd, tr glauc, aggs wl cons w/ kao mtx, calc cmt, pr vis por, no fluor.
	5	CLAYSTONE: as above, lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp
1745-1750	70	SANDSTONE: as above
	25	CLAYSTONRE: as above
	5	SHALE: as a bove
1750-1755	90	SANDSTONE: as above
	10	CLAYSTONE: as above
1755-1758	95	SANDSTONE: as above
	5	CLAYSTONE: as above
1758-1764	95	SANDSTONE: generally as above, clr-lt gy, transl, f-v c grn, pred med-c grn, pr srtd, lse, dissaggs, tr kaol mtx, gd inf por, no fluor.
	5	CLAYSTONE: generally as above, lt brn-lt brn gy-lt gy, v slty i/p, grades to Siltstone i/p, com micmic, tr diss pyr, tr carb spks, tr liths, sli calc, v sft-occ frm, stky, sbblky-amorp
1764-1767	90	SANDSTONE: as above
	10	SILTSTONE: dk brn-yell brn, w/ com blk carbonaceous lams, grades to Silty Coal i/p, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky.
	Tr	CLAYSTONE: as above
1767-1770	90	SANDSTONE: as above
	10	SILTSTONE: as above
	Tr	CLAYSTONE: as above
1770-1773	70	SANDSTONE: clr-lt gy, v f-med grn, occ crs, tr micmic, tr red liths, sbang-sbrnd, pr-mod wl srtd, tr glauc, aggs w/ kaol mtx,calc cmt, pr vis por, no fluor.
	30	CLAYSTONE: lt brn-brn gy, slty, micmic, tr diss pyr, tr carb spks, tr liths, sli calc,sft-frm, stky-sbblky-amorp.
	Tr	SILTSTONE: as above
1773-1776	70	SANDSTONE: as above
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1776-1779	70	SANDSTONE: as above
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1779-1782	80	SANDSTONE: generally as above, clr-lt gy, v f-med grn, occ crs, tr micmic, tr red liths, sbang-sbrnd, pr-mod wl srtd, tr glauc, aggs w/ kaol mtx,calc cmt, pr vis por, no fluor.
	20	CLAYSTONE: as above, lt brn-brn gy, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-amorp.
	Tr	SILTSTONE: as above
1782-1785	70	SANDSTONE: as above
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1785-1788	60	SANDSTONE: as above

	40	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1788-1791	60	SANDSTONE: generally as above, clr-lt gy, v f-med grn, occ crs, tr micmic, tr red liths, sbang-sbrnd, pr-mod wl srtd, tr glauc, aggs w/ kaol mtx,calc cmt, pr vis por, no fluor.
	40	CLAYSTONE: as above, lt brn-brn gy, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-amorp.
	Tr	SILTSTONE: as above
1791-1794	40	SANDSTONE: as above
	60	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1794-1797	40	SANDSTONE: , lt brn-lt gy, v f-v crs, com crs, sbang-sbrnd, pr-mod wl srtd, tr glauc, aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	60	CLAYSTONE: as above, lt brn-brn gy,occ grn gy, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-amorp
	Tr	SILTSTONE: dk brn-yell brn, w/ com blk carbonaceous spks, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky.
1797-1800	50	SANDSTONE: as above
	50	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1800-1803	70	SANDSTONE: generally as above, pred vf-f grn.
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1803-1806	80	SANDSTONE: as above
	20	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1806-1809	70	SANDSTONE: generally as above, lt brn-lt gy,transl, v f-v crs, com crs, ang-sbrnd, pr-srtd, tr glauc, aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	30	CLAYSTONE: as above, med lt gy-grn gy-olv gy, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss.
	Tr	SILTSTONE: as above
1809-1812	70	SANDSTONE: as above
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1812-1815	70	SANDSTONE: as above
	30	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1815-1818	60	SANDSTONE: generally as above, clr-lt brn-lt gy,transl, v f-v crs, com med, ang-sbrnd, pr-srtd, tr glauc, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: as above, med lt gy-grn gy-olv gy, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss
	Tr	SILTSTONE: as above
1818-1821	60	SANDSTONE: as above
	40	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1821-1824	60	SANDSTONE: generally as above, clr-lt brn-lt gy,transl, v f-v crs, com med, ang-sbrnd, pr-srtd, tr glauc, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: as above, med lt gy-grn gy-olv gy, occ yel brn, occ blk carb lams, slty, micmic, tr diss pyr, tr-com carb spks, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss

1828-1830	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1830-1833	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1833-1836	60	SANDSTONE: generally as above, clr-lt brn-lt gy, transl, v f-v crs, com crs, ang-sbrnd, pr-srtd, tr glauc, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss
1836-1839	50	SANDSTONE: as above
	50	CLAYSTONE: as above
	Tr	SILTSTONE: dk brn-yell brn, w/ com blk carbonaceous spks, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky
1839-1842	40	SANDSTONE: as above
	60	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1842-1845	70	SANDSTONE: generally as above, clr-lt gy, transl, v f-v crs, com crs, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	30	CLAYSTONE: as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss.
1845-1848	70	SANDSTONE: as above
	30	CLAYSTONE: as above
1848-1851	80	SANDSTONE: as above, pred med grn, sbang-sbrnd, lse dissaggs.
	20	CLAYSTONE: as above
1851-1854	70	SANDSTONE: as above
	30	CLAYSTONE: as above
1854-1857	70	SANDSTONE: generally as above, pred vf-f grn, sbrnd-sbang, wl srtd.
	30	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss, occ grades to Shale.
1857-1863	70	SANDSTONE: clr-lt gy, transl, occ crs mlky qtz, v f-v crs, com crs, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	30	CLAYSTONE: as above
1863-1866	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1866-1869	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1869-1872	50	SANDSTONE: clr-lt gy, transl, occ crs mlky qtz, v f-v crs, com crs, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	50	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss, occ grades to Shale.
1872-1875	50	SANDSTONE: as above
	50	CLAYSTONE: as above
1875-1878	50	SANDSTONE: generally as sbove, pred f grn, sbang-sbrnd, mod wl srtd.
	50	CLAYSTONE: as above
	Tr	SILTSTONE: dk brn-yell brn, w/ com blk carbonaceous spks, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky
1878-1881	60	SANDSTONE: as above

	40	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1881-1884	60	SANDSTONE: clr-lt gy, transl, occ crs mlky qtz, v f-v crs, com crs, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss, occ grades to Shale.
	Tr	SILTSTONE: as above, dk brn-yell brn, w/ com blk carbonaceous spks, com micmic, tr vf grn qtz slt, non calc, brit-frm, sbblky-blky
1884-1887	60	SANDSTONE: as above
	40	CLAYSTONE: as above
	Tr	SILTSTONE: as above
1887-1890	70	SANDSTONE: as above
	30	CLAYSTONE: as above
1890-1893	60	SANDSTONE: clr-lt gy, transl, v f-v crs, pred f-med grn, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss.
1893-1896	60	SANDSTONE: as above, pred f-vf grn, mod wl srtd, lse dissaggs.
	40	CLAYSTONE: as above
1896-1899	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1899-1902	60	SANDSTONE: generally as above, clr-lt gy, transl, v f-v crs, pred f-med grn, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	40	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, tr liths, sli calc,sft-frm, stky-sbblky-sbfiss.
1902-1905	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1905-1908	60	SANDSTONE: as above
	40	CLAYSTONE: as above
1908-1911	50	SANDSTONE: generally as above, clr-lt gy, occ lt brn,transp-transl, v f-v crs, pred med grn, ang-sbrnd, pr-mod srtd, f grn aggs w/ kaol mtx,wk calc cmt, tr sil cmt, tr pyr, tr mica, pr vis por, no fluor.
	50	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, occ blk carb lams, sli calc,sft-frm, stky-sbblky-sbfiss.
1911-1914	30	SANDSTONE: as above
	10	SILTSTONE: med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, cly mtx, frm-occ sli hd,sbblky-sbfiss.
	60	CLAYSTONE: as above
1914-1917	50	SANDSTONE: clr-lt gy, transl-transp, vf-crs grn, pred f grn, ang-rnd, pr-mod wl srtd, tr pyr, tr mica, tr carb mat, dom lse, occ kao myx, wl calc cmt i/p, lse-fria, pr-gd inf por, no fluor.
	15	SILTSTONE: as above
	35	CLAYSTONE: as above
1917-1920	50	SANDSTONE: as above
	10	SILTSTONE: as above
	40	CLAYSTONE: as above
1920-1923	60	SANDSTONE: generally as above, pred med grn, lse, gd inf por, no fluor.
	15	SILTSTONE: as above
	25	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, stky-sbblky-sbfiss
1923-1926	40	SANDSTONE: as above
	10	SILTSTONE: as above

	50	CLAYSTONE: as above
1926-1929	50	SANDSTONE: as above
	30	SILTSTONE: as above
	20	CLAYSTONE: as above
1929-1932	40	SANDSTONE: generally as above, clr-lt gy, transl-transp, f-med grn, occ crs grn, ang-rnd, pr-mod wl srtd, tr pyr, tr mica, tr carb mat, dom lse, occ kao myx, wl calc cmt i/p, lse-fria, pr-gd inf por, no fluor.
	40	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss.
	20	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, stky-sbblky-sbfiss, fiss i/p.
1932-1935	30	SANDSTONE: as above
	30	SILTSTONE: as above
	40	CLAYSTONE: as above
1935-1938	40	SANDSTONE: as above
	30	SILTSTONE: as above
	20	CLAYSTONE: as above
1938-1941	15	SANDSTONE: generally as above, clr-lt gy, transl-transp, f-med grn, occ crs grn, pred fn grn, ang-rnd, pr-mod wl srtd, tr pyr, tr mica, tr carb mat, dom lse, occ kao myx, wl calc cmt i/p, lse-fria, pr-gd inf por, no fluor.
	65	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss.
	20	CLAYSTONE: generally as above, med lt gy-grn gy-olv gy, occ yel brn, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, fiss i/p.
1941-1944	20	SANDSTONE: as above
	60	SILTSTONE: as above
	20	CLAYSTONE: as above
1944-1947	30	SANDSTONE: as above
	40	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss.
	30	CLAYSTONE: generally as above, med lt gy-grn gy-med gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, fiss i/p.
1947-1950	60	CLAYSTONE: generally as above
	20	SANDSTONE: as above
	20	SILTSTONE: as above
1950-1953	85	CLAYSTONE: generally as above, med lt gy-grn gy-med gy, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	10	SANDSTONE: generally as above, clr-lt gy, transl-transp, f-crs grn, occ v crs grn, pred crs grn, ang-sbrnd, pr-mod wl srtd, tr pyr, tr mica, tr carb mat, dom lse, occ kao myx, wl calc cmt i/p, lse-fria, pr-gd inf por, no fluor.
	5	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss
1953-1956	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	SILTSTONE: as above
1956-1959	80	CLAYSTONE: as above
	10	SANDSTONE: as above
	10	SILTSTONE: as above

1959-1962	85	CLAYSTONE: generally as above, med lt gy-grn gy-med gy, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	5	SANDSTONE: as above
	10	SILTSTONE: as above
1962-1965	85	CLAYSTONE: as above
	5	SANDSTONE: as above
	10	SILTSTONE: as above
1965-1968	90	CLAYSTONE: as above, med lt gy-grn gy-pl yel brn, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	5	SANDSTONE: generally as above, clr-lt gy, transl-transp, f-crs grn, occ v crs grn, pred crs grn, ang-sbrnd, pr-mod wl srtd, tr pyr, tr mica, tr carb mat, dom lse, occ kao myx, wl calc cmt i/p, lse-fria, pr-gd inf por, no fluor.
	5	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss
1968-1971	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	SILTSTONE: as above
1971-1974	90	CLAYSTONE: as above
	5	SANDSTONE: as above
	5	SILTSTONE: as above
1974-1977	95	CLAYSTONE: as above, med lt gy-grn gy-pl yel brn, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	5	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-occ sli hd,sbblky-sbfiss
	Tr	SANDSTONE: as above
1977-1980	95	CLAYSTONE: as above
	5	SILTSTONE: as above
1980-1983	90	CLAYSTONE: as above
	10	SANDSTONE: lt gy-lt brn, clr, transp-transl, v f- crs grn, occ v crs grns, pr srtd, ang-sbrnd, sil cmt, com arg mtx, tr pyr, fria-lse, occ hd, pr inf por, no fluor.
1983-1986	80	CLAYSTONE: as above
	20	SANDSTONE: as above
1986-1989	90	CLAYSTONE: as above
	10	SANDSTONE: as above
1989-1992	95	CLAYSTONE: as above
	5	SANDSTONE: as above
1992-1995	95	CLAYSTONE: as above, med lt gy-grn gy-pl yel brn, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	5	SANDSTONE: lt gy-lt brn, clr, transp-transl, v f- crs grn, occ v crs grns, pr srtd, ang-sbrnd, sil cmt, com arg mtx, tr pyr, fria-lse, occ hd, pr inf por, no fluor.
1995-1998	100	CLAYSTONE: as above
	Tr	SANDSTONE: as above
1998-2001	100	CLAYSTONE: as above
	Tr	SANDSTONE: as above
2001-2004	100	CLAYSTONE: as above, med lt gy-grn gy-pl yel brn, occ lt brn gy, occ v slty, micmic, tr diss pyr, tr-com carb spks, sli – non calc,sft-frm, sbblky-sbfiss, amorp-washable i/p.
	Tr	SANDSTONE: as above

2004-2007	20	SANDSTONE: clr-lt gy, transp-transl, f-crs grn, pred f grn, occ v crs grn, sbang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr red liths, gd inf por. FLUOR: trace faint yellowish orange fluorescence, slow streaming dull yellowish white cut fluor, dull orangish white residual ring.
	80	CLAYSTONE: as above
2007-2008	70	SANDSTONE: as above
	30	CLAYSTONE: as above
2008-2017		CORED
2017-2018	85	CLAYSTONE: lt gy-gy, occ brn gy, grn gy, calc, slty i/p, tr pyr, tr micmic, sft-frm, sbblky-blky.
	10	SANDSTONE: generally as above, no fluor.
	5	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-brit, sbblky-sbfiss
2018-2022	70	CLAYSTONE: as above
	20	SANDSTONE: as above
	10	SILTSTONE: as above
2022-2025	65	CLAYSTONE: as above
	30	SANDSTONE: clr-lt gy, transp-transl, f-crs grn, pred f-med grn, occ v crs grn, sbang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr red liths, gd inf por, tr org min fluor.
	5	SILTSTONE: generally as above
2025-2028	70	CLAYSTONE: as above
	20	SANDSTONE: as above
	10	SILTSTONE: as above
2028-2031	60	CLAYSTONE: : generally as above, lt gy-gy, occ brn gy, grn gy, calc, slty i/p, tr pyr, tr micmic, sft-frm, sbblky-blky.
	30	SANDSTONE: generally as above, clr-lt gy, transp-transl, f-crs grn, pred f-med grn, occ v crs grn, sbang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr red liths, gd inf por, tr org min fluor
	10	SILTSTONE: as above
	Tr	LIMESTONE: wh-lt gy- v pl org, micxln-cryptxln, tr arg, sndy i/p,sft-frm, grades to Dolomite i/p,sbblky-blky.
2031-2034	60	CLAYSTONE: as above
	20	SANDSTONE: as above
	10	SILTSTONE: generally as above, occ blk carb/coaly lams.
	10	COAL: blk-dk brn blk, slty, dul sb vit lstr, sbconch frac, frm-brit.
2034-2037	50	CLAYSTONE: as above
	30	SANDSTONE: generally as above, clr-lt gy, transp-transl, f-crs grn, pred med-crs grn, occ v crs grn, sbang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, tr org min fluor
	20	SILTSTONE:
2037-2040	70	SANDSTONE: generally as above, clr-lt gy, transp-transl, f-crs grn, pred crs grn, occ v crs grn, sbang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, tr org min fluor
	20	CLAYSTONE: as above
	10	SILTSTONE: as above
2040-2043	60	SANDSTONE: as above
	30	CLAYSTONE: as above
	10	SILTSTONE: as above

2043-2046	70	SANDSTONE: generally as above, clr-lt gy, transp-transl, f-crs grn, pred crs grn, occ v crs grn, ang-sbrnd, mod wl srtd, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor.
	20	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, calc, slty i/p, tr pyr, tr micmic, sft-frm, sbblky-blky.
	10	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, rr-com blk carb mat, com vf qtz grns, cly mtx, frm-brit, sbblky-sbfiss
2046-2049	50	SANDSTONE: as above
	40	CLAYSTONE: as above
	10	SILTSTONE: as above
2049-2052	50	SANDSTONE: as above
	40	CLAYSTONE: as above
	10	SILTSTONE: as above
2052-2055	60	SANDSTONE: generally as above, clr-lt gy, transp-transl, vf-crs grn, pred f-med grn, occ v crs grn, ang-sbrnd, pr srtd, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor.
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
2055-2058	60	SANDSTONE: generally as above, clr-lt gy, transp-transl, vf-crs grn, pred f-med grn, occ v crs grn, ang-sbrnd, pr srtd, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor.
	25	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, calc, slty i/p, tr pyr, tr micmic, sft-frm, sbblky-blky.
	10	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, tr-com blk carb mat, com vf qtz grns, cly mtx, frm-brit, sbblky-sbfiss
	5	COAL: blk-dk brn blk, slty, dul sb vit lstr, sbconch frac, frm-brit.
2058-2061	70	SANDSTONE: as above
	20	CLAYSTONE: as above
	5	SILTSTONE: as above
	5	COAL: as above
2061-2064	70	SANDSTONE: as above
	20	CLAYSTONE: as above
	5	SILTSTONE: as above
	5	COAL: as above
2064-2067	60	SANDSTONE: generally as above, clr-lt gy, transp-transl, vf-crs grn, pred f-med grn, occ v crs grn, ang-sbrnd, pr srtd, tr pyr, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor
	25	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-blky.
	10	SILTSTONE: generally as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, tr-com blk carb mat, com vf qtz grns, cly mtx, frm-hd, sbblky-sbfiss.
	5	COAL: as above
2067-2070	60	SANDSTONE: as above
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
2070-2073	70	SANDSTONE: as above
	20	CLAYSTONE: as above
	10	SILTSTONE: as above

2073-2076	60	SANDSTONE: generally as above, clr-lt gy, transp-transl, vf-crs grn, pred f-med grn, occ v crs grn, ang-sbrnd, pr srtd, tr pyr, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
2076-2079	60	SANDSTONE: as above
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
2079-2082	70	SANDSTONE: generally as above, clr-lt gy, v pl org, transp-transl, vf-crs grn, pred med grn, occ v crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor
	20	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, sli calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-sbfiss.
	10	SILTSTONE: as above
2082-2085	60	SANDSTONE: as above
	30	CLAYSTONE: as above
	10	SILTSTONE: as above
2085-2088	70	SANDSTONE: as above, pred crs grn, mod wl srtd, no fluor.
	20	CLAYSTONE: as above
	10	SILTSTONE: as above
2088-2091	70	SANDSTONE: as above
	20	CLAYSTONE: as above
	10	SILTSTONE: as above
2091-2094	80	SANDSTONE: as above
	15	CLAYSTONE: as above
	5	SILTSTONE: as above
2094-2097	90	SANDSTONE: generally as above, clr-lt gy, v pl org, transp-transl, vf-crs grn, pred crs grn, occ v crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr blk carb spks, tr mica, gd inf por, no fluor
	10	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, sli calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-sbfiss
	Tr	SILTSTONE: as above
2097-2100	90	SANDSTONE: as above
	10	CLAYSTONE: as above
2100-2103	95	SANDSTONE: as above
	5	CLAYSTONE: as above
2103-2106	95	SANDSTONE: as above, pred crs, lse, dg inf por, nmo fluor.
	5	CLAYSTONE: as above, hd, sbblky-sbfiss, fiss i/p.
2106-2109	95	SANDSTONE: as above
	5	CLAYSTONE: as above
2109-2112	95	SANDSTONE: generally as above, clr-lt gy, occ v pl org, transp-transl, vf-vcrs grn, pred crs-v crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr mica, gd inf por, no fluor
	5	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, sli calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-sbfiss
2112-2115	95	SANDSTONE: as above
	5	CLAYSTONE: as above
2115-2118	80	SANDSTONE: as above
	5	SILTSTONE: med brn-med dk gy-gy brn, com micmic, tr dis pyr, tr-com blk carb mat, tt carb lams, com vf qtz grns, cly mtx, frm-hd, sbblky-sbfiss.
	15	CLAYSTONE: as above

2118-2121	70	SANDSTONE: as above
	5	SILTSTONE: as above
	25	CLAYSTONE: as above
2121-2124	85	SANDSTONE: as above
	5	SILTSTONE: as above
	10	CLAYSTONE: as above
2124-2127	95	SANDSTONE: as above, clr-lt gy, transp-transl, vf-v crs grn, pred crs-v crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr mica, gd inf por, no fluor.
	Tr	SILTSTONE: as above
	5	CLAYSTONE: as above
2127-2130	70	SANDSTONE: as above
	10	SILTSTONE: as above
	20	CLAYSTONE: as above
2130-2133	85	SANDSTONE: as above
	Tr	SILTSTONE: as above
	15	CLAYSTONE: as above
2133-2136	80	SANDSTONE: as above, clr-lt gy, transp-transl, vf-v crs grn, pred crs-v crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr mica, gd inf por, no fluor.
	5	SILTSTONE: as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, tr-com blk carb mat, tt carb lams, com vf qtz grns, cly mtx, frm-hd, sbblky-sbfiss.
	15	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, sli calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-sbfiss
2136-2139	65	SANDSTONE: as above
	5	SILTSTONE: as above
	30	CLAYSTONE: as above
2139-2142	65	SANDSTONE: as above
	5	SILTSTONE: as above
	30	CLAYSTONE: as above
2142-2145	70	SANDSTONE: as above
	Tr	SILTSTONE: as above
	30	CLAYSTONE: as above
2145-2148	85	SANDSTONE: as above, clr-lt gy, transp-transl, m- crs grn, pred crs grn, ang-sbrnd, pr-mod srtd, tr pyr, tr kaol mtx, pred lse, tr mica, gd inf por, no fluor.
	5	SILTSTONE: as above, med brn-med dk gy-gy brn, com micmic, tr dis pyr, tr-com blk carb mat, tt carb lams, com vf qtz grns, cly mtx, frm-hd, sbblky-sbfiss.
	10	CLAYSTONE: generally as above, lt gy-gy, occ brn gy, grn gy, sli calc, slty i/p, tr pyr, tr micmic, -frm-hd, sbblky-sbfiss
2148-2151	90	SANDSTONE: as above
	Tr	SILTSTONE: as above
	10	CLAYSTONE: as above
2151-2154	90	SANDSTONE: as above, pred vf-f grn, pr srtd, lse, occ crs-vcrs grn conglomerate, clr-yel brn, v ang qtz grns, sil cmt, hd, pr inf por, no fluor.
	Tr	SILTSTONE: as above
	10	CLAYSTONE: as above
2154-2157	85	SANDSTONE: as above
	Tr	SILTSTONE: as above
	15	CLAYSTONE: as above
2157-2160	90	SANDSTONE: as above, vf-v crs grn, pred med grn, occ v ang, lse.
	Tr	SILTSTONE: as above, com blk carb lams, grades to silty Coal i/p.
	10	CLAYSTONE: as above
2160-2163	85	SANDSTONE: as above

	5	SILTSTONE: as above
	10	CLAYSTONE: as above
2163-2166	95	SANDSTONE: as above, pred crs-v crs grn,mod wl srtd.
	Tr	SILTSTONE: as above
	5	CLAYSTONE: as above
2166-2169	90	SANDSTONE: as above, w/ tr weathered meta/quartzite, off wh-mottled-lt blu gn, v hd-dense.
	Tr	SILTSTONE: as above
	10	CLAYSTONE: as above
2169-2172	90	SANDSTONE: as above
	Tr	SILTSTONE: as above
	10	CLAYSTONE: as above
2172-2175	90	IGNEOUS: wh-mkky wh, transl-transp, pl red-purple-pl pink, occ yell brn & pl grn, com blky-ang frags, com fresh fspr & occ altered to kaol, ang qtz xtals, tr pyr, mica, tr dk grn hornblend? & blk pyroxene, hd-v hd, com mass text, granular i/p.
	Tr	SANDSTONE: as above
	Tr	CLAYSTONE: as above
2175-2178	100	IGNEOUS: as above
	Tr	SANDSTONE: as above
2178-2181	100	IGNEOUS: as above
	Tr	SANDSTONE: as above
2181-2184	100	IGNEOUS: as above
2184-2187	100	IGNEOUS: as above
2187-2190	100	IGNEOUS: as above, wh-mkky wh, transl-transp, pl red-purple-pl pink, occ yell brn & pl grn, com blky-ang frags, com fresh fspr & occ altered to kaol, ang qtz xtals, tr pyr, mica, tr dk grn hornblend? & blk pyroxene, hd-v hd, com mass text, granular i/p.
2190-2193	100	IGNEOUS: as above
2193-2196	100	IGNEOUS: as above
2196-2199	100	IGNEOUS: as above
2199-2202	100	IGNEOUS: as above
2202-2205	100	IGNEOUS: as above, wh-mkky wh, transl-transp, pl red-purple-pl pink, occ yell brn & pl grn, com blky-ang frags, com fresh fspr & occ altered to kaol, ang qtz xtals, tr pyr, mica, tr dk grn hornblend? & blk pyroxene, hd-v hd, com mass text, granular i/p.
2205-2208	100	IGNEOUS: as above
2208-2211	100	IGNEOUS: as above
2211-2215	100	IGNEOUS: as above
2215-2218	100	IGNEOUS: as above
2218-2220	100	IGNEOUS: as above, wh-mkky wh, transl-transp, pl red-purple-pl pink, occ yell brn & pl grn, com blky-ang frags, com fresh fspr & occ altered to kaol, ang qtz xtals, tr pyr, mica, tr dk grn hornblend? & blk pyroxene, hd-v hd, com mass text, granular i/p. Well TD at 2220 mRt @ 00:30 on 19/06/98

APPENDIX 3

CORE CHIP DESCRIPTIONS

WHITE IBIS 1

570116

PREMIER OIL (AUSTRALASIA) - WELLSITE CORE DESCRIPTIONS

Permit:T /18 P
Well:WHITE IBIS 1
Core No:1
Formation:EVCM
Described by:Frankiewicz

Interval: 2008 mRt – 2017.0 mRt
Cut: 9.0 metres
Recovered: 0.72 metres
% Rec: 8%
Core Bit: 12 1/4" Corepro CM365

Date: 17/06/98
Lat: 39° 57' 49.607" S
Long:145° 15' 17.234" E
KB: 12.5m
GL: -74.4m

DEPTH ROP m/hr	LITHOLOGY Grain Size	LITHOLOGICAL DESCRIPTIONS and REMARKS	H/C INDICATIONS
35 30 25 20 15 10 5 0	v coarse Coarse Med Fine Silt		Good Fair Poor
2008		**2008.0: SANDSTONE:** off white-light grey-light brown-frosted, translucent, very fine-coarse grained, predominantly fine-medium, subrounded-sbangular, moderately well sorted, common kaolinite matrix,silaceous cement,trace carbonaceous matter, trace lithic fragments, trace mica flakes, friable, poor-moderate visible porosity.	Trace, dull yellowish white pinpoint fluorescence, slow streaming dull greyish white cut fluorescence, bright chalky white residual ring.
2009		**2008.72m: SANDSTONE:** generally as above.	as above
2010			
2011			
2012			
2113			
2014			
2015			
2016			
2017			

5 cm

570117

APPENDIX 4

SIDEWALL CORE DESCRIPTIONS

WHITE IBIS 1

570118

Premier Oil Australasia

WIRELINE LOGGING – SIDEWALL CORE DESCRIPTIONS

WELL NO: White Ibis 1
DATE: 29/06/98

RUN NO: 1

CORES SHOT	MISFIRED	LOST	EMPTY	RECOVERED

GEOLOGIST: K. Frankiewicz
ENGINEER; Y. Frans

SHOT NO.	DEPTH (MD)	REC	LITHOLOGY DESCRIPTION	GRAIN			CMT TYPE	HYDROCARBON SHOW
		CM	1	SIZE	SHAPE	SORT		STAIN/FLUORESCENCE/CUT/RESIDUE
1	213O.1	2	SANDSTONE grading to SILTSTONE	V. FINE-MED	SBANG	POOR	SILICEOUS	
2	2170.2	1	GLAUCONITIC SANDSTONE	V.FINE-MED	SBANG-ANG	POOR	SILICEOUS	
3	2156.3	1.8	GREY SILTSTONE	V.FINE	SBBLKY	V. WELL		
4	2152.3	2.0	SANDSTONE:TRANSLUCENT,WHITE	MED-CRS	SBANG	WELL	SILICEOUS	
5	2140.4	2.0	GREY SILTSTONE, POOR POROSITY	V.FINE	AMORPHOUS			
6	2130.9	2.0	SILTSTONE grading to fine SANDSTONE	FINE	SBANG-SR	WELL		
7	2125.5	1.1	SILTSTONE with minor SHALE		SBBLKY			
8	2106.6	2.8	SANDSTONE:TRANSLUCENT,WHITE	MED-CRS	SBANG-SR	WELL	SILICEOUS	
9	2098.1	2.0	SILTY CLAYSTONE		AMORPHOUS			
10	2080.2	2.1	SANDSTONE	MED-CRS	SBANG-SR	WELL		PALE YEL,WH,DIRECT,NO CUT
11	2071.8	2.2	SILTSTONE grading to fine SANDSTONE	FINE	SBANG-SR	WELL		NO SHOW
12	2058.8	3.0	SANDSTONE WITH CLAYSTONE	MED-CRS	SBANG-SR	POOR		NO SHOW
13	2052.9	2.1	SILTSTONE GRADING TO FINE SANDSTONE	MED-FINE	SBANG-SR	MED		NO SHOWS
14	2049.0	1.8	SANDSTONE	MED-CRS	SBANG-SR	POOR		NO SHOWS
15	2046.0	2.8	SANDSTONE	MED-CRS	SBANG-SR	MODERATE		PALE YEL DIRECT.NO CUT
16	2043.1	2.5	CLAYSTONE		AMORPHOUS			
17	2027.1	1.2	CLAYSTONE		AMORPHOUS			

570119

Premier Oil Australasia

WIRELINE LOGGING – SIDEWALL CORE DESCRIPTIONS

WELL NO: White Ibis 1
DATE: 29/06/98

RUN NO: 1

CORES SHOT	MISFIRED	LOST	EMPTY	RECOVERED

GEOLOGIST: K. Frankiewicz
ENGINEER; Y. Frans

SHOT NO.	DEPTH (MD)	REC	LITHOLOGY DESCRIPTION	GRAIN			CMT TYPE	HYDROCARBON SHOW
		CM	1	SIZE	SHAPE	SORT		STAIN/FLUORESCENCE/CUT/RESIDUE
18	2024.2	3.7	SANDSTONE	V.FINE-MED	SBANG-SR	POOR		WH-YEL DIRECT.PALE YEL CUT.
19	2016.7	2.6	SANDSTONE	FINE-MED	SBANG-ANG	MOD		NO SHOWS
20	2015.3	2.7	SANDSTONE	V.FINE-FINE	SBANG-SR	WELL		WK PALE YEL.NO CUT
21	2011.4	3.4	SANDSTONE	VFINE-FINE	SBANG-SR	MOD		WH-YEL DIRECT.PALE YEL CUT
22	2008.5	2.5	SANDSTONE	V.FINE-FINE	SBANG-SR	MOD		NO SHOWS
23	2006.0	2.7	SANDSTONE	FINE-MED	SBANG-SR	MOD		BRIGHT YEL DIRECT.WHITE YEL CUT.
24	2003.6	2.7	SANDSTONE	V.FINE-FINE	SBANG-SR	POOR		NO SHOWS
25	1998.2	2.2	CLAYSTONE		AMORPHOUS			
26	1991.7	2.5	CLAYSTONE		AMORPHOUS			
27	1986.3	2.0	CLAYSTONE WITH SANDSTONE	FINE-	SBANG-SR	MOD		PALE YEL,WH,DIRECT,PALE CUT
28	1982.3	3.2	SILTSTONE grading to fine SANDSTONE	FINE	SBANG-SR	WELL		NO SHOW
29	1977.4	1.4	SANDSTONE	FINE-MED	SBANG-SR	MOD		DIR YEL-GREEN. CUT MILKY-WHITE
30	1967.0	1.8	CLAYSTONE		AMORPHOUS			

APPENDIX 5

ROUTINE CORE ANALYSIS AND CORE PHOTOGRAPHY

By

GEOTECHNICAL SERVICES PTY LTD

WHITE IBIS 1

570121

ROUTINE CORE ANALYSIS REPORT

WHITE IBIS-1

Prepared by:
Khiam Ooi

Prepared for:
Premier Oil Australia Pty Ltd

July 1998

GEOTECH GEOTECHNICAL SERVICES PTY LTD
41- 45 Furnace Road, Welshpool, Western Australia. 6106
Locked Bag 27, Cannington, Western Australia. 6107

Telephone: (08) 9458 8877
Facsimile: (08) 9458 8857
Email: geotech@ilnet.net.au

570122

GEOTECH GEOTECHNICAL SERVICES PTY LTD

21- 45 Furnace Road, Welshpool, Western Australia. 6106
Locked Bag 27, Cannington, Western Australia. 6107

Telephone: (08) 9458 8877
Facsimile: (08) 9458 8857
Email: geotech@ilnet.net.au

July 23,1998

Mr. David Evans
Premier Oil Australia Pty Ltd
45 Ord Street
West Perth, WA 6872

Dear Dave,

Re: White Ibis-1, Routine core analysis

On June 25, 1998, we received a box of containing 0.72m of core from 2008.0 to 2008.72m. Upon arrival, the core was unpacked and inspected under UV light for fluorescence . No fluorescence due to hydrocarbons was observed.

The core was photographed under white light in an A4 size format. Four copies of the photographs were sent to Premier Oil on the July 1, 1998. After core photography, a 1 ½ " diameter core plug was cut from the 2008.05m using liquid nitrogen. Two geochemical samples were taken and preserved for future analysis.

The "dirty" plug was dried in a convectional fan forced oven overnight at 95 degrees centigrade. It was allowed to cool to room temperature in an evacuated dessicator prior to poroperm/ grain density measurements. The plug had an air permeability of 44 mD, helium porosity of 18.1% and grain density of 2.66 g/cc.

The plug was remeasured after it had been solvent extracted in toluene and methanol to remove hydrocarbons and salt. The air permeability, helium porosity and grain density of the "clean" plug was 47mD, 18.3% and 2.66 g/cc respectively.

Please do not hesitate to contact us if you have any queries.

Yours sincerely,

Khiam Ooi
Manager-Core Analysis

C:\aCORE ANALYSIS\reports\WhiteIbis-1.doc

570123

PREMIER OIL AUSTRALIA
WHITE IBIS-1

2008.0M



10 20 30 40 50 60 70 80 90 100

GEOTECHNICAL SERVICES PTY LTD

5 cm

ENCL. 1 OR-0461

570124

APPENDIX 6

SURVEY/DEVIATION DATA

WHITE IBIS 1

570125

Deviation Survey

WELL : White Ibis 1

Wellhead Location

LAT.	DEG : 39	MIN : 57	SEC : 49.607
LONG.	DEG : 145	MIN : 15	SEC : 17.234

MD (ft)	TVD1 (ft)	INCL (deg)	AZIMUTH (deg)	CORRECT AZ (deg)	DOGLEG (deg 100ft)	V SECT (m)	N/S	E/W
87.00	87.00	1.25						
107.00	107.00	0.50						
103.00	103.00	1.00						
113.00	113.00	0.00						
125.00	125.00	2.00						
128.00	128.00	1.50						
182.00	182.00	1.00						
193.00	193.00	1.00						
198.00	198.00	1.50						
221.00	221.00	1.50						
250.00	250.00	0.50						
279.00	279.00	1.00						
394.00	394.00	1.00						
451.00	451.00	0.00						
565.00	565.00	1.00						
623.00	623.00	0.00						
652.00	652.00	0.00						
681.00	681.00	0.00						
710.00	710.00	0.00						
739.00	739.00	0.00						
766.00	766.00	0.00						
795.00	795.00	0.00						
823.00	823.00	0.00						
852.00	852.00	0.00						
863.00	863.00	0.00						
890.00	890.00	0.00						
908.00	908.00	0.00						
936.00	936.00	0.00						
963.00	963.00	0.00						
991.00	991.00	0.00						
1,022.00	1,022.00	0.00						
1,050.00	1,050.00	0.00						
1,078.00	1,078.00	0.00						
1,107.00	1,107.00	0.00						
1,136.00	1,136.00	0.00						
1,164.00	1,164.00	0.00						
1,193.00	1,193.00	0.00						
1,222.00	1,222.00	0.00						
1,251.00	1,251.00	0.50						
1,308.00	1,308.00	0.50						
1,362.00	1,362.00	0.50						
1,422.00	1,422.00	0.50						
1,479.00	1,479.00	0.50						
1,594.00	1,594.00	0.00						
1,680.00	1,680.00	0.50						
1,768.00	1,768.00	0.50						
1,852.00	1,852.00	1.00						
1,937.00	1,937.00	0.00						
1,944.00	1,944.00	0.50						

Copyright IDS Pty Ltd, June 1998

570126

APPENDIX 7

LOG ANALYSIS (EVALUATION REPORT)

By

IKODA PTY LTD

WHITE IBIS 1

570127

New Evaluation of White Ibis

Submitted to
Premier Oil Australasia

October 1998

Prepared by
IKODA Pty Ltd.
41-43 Ord Street,
West Perth 6005,
Western Australia

Telephone: 61-(0)8 9322 5612
Facsimile: 61-(0)8 9322 1216

IKODA
PTY LTD

570128

WHITE IBIS: NEW WELL LOG EVALUATION

1.0 Executive Summary

A new well log evaluation of White Ibis has been carried out using a probabilistic method, and is based upon a mineralogical model derived from quantitative XRD analyses of sidewall cores. According to the model, most of the sands between 2000 and 2155 m contain hydrocarbons. The zones where the sands are relatively thick and have low water saturations, roughly coincide with the hydrocarbon zones determined by the MDT. According to this tool, there are three separate hydrocarbon zones between 2000 and 2155 metres, whilst according to the log analysis, all the sands in this interval are hydrocarbon bearing to a certain extent. However, the water saturation of sands outside the hydrocarbon zones determined by the MDT are generally high (above the 0.60 cut-off) and cannot be regarded as pay. Note that there are gas shows over intervals where the MDT indicates non-movable hydrocarbons. It is interesting to note that the ELAN-CMR analysis performed by Schlumberger, also "sees" hydrocarbons in this interval, with water saturations ranging between 0.50 and 1.0 (with an average of about 0.80).

The present evaluation compares relatively well with the ELAN-CMR analysis. The ELAN-CMR values of porosity tend to be about 10 % lower and the Sw values tend to be in the range 5 to 15% higher than those calculated in the present evaluation.

According to the present evaluation, the hydrocarbon height is 2.52 m3/m2 at reservoir conditions.

2.0 Introduction

A first evaluation of White Ibis was carried out in June, 1998. At that stage, without a definite knowledge of the mineral composition of the hydrocarbon bearing sands, the Crocker Data Processing package (shaly sand model) was used to perform the evaluation. From crossplots, the shale neutron response and the shale density were estimated to be 0.40 and 2.60 g/cc, respectively. The Indonesia equation was used to calculate Sw, using a shale resistivity of 12 ohmm. The following cut-offs were applied to discriminate 'pay': Vsh <0.30, Phie> 0.05 and Sw< 0.60. The model yielded a net pay of 22.71 m, an average porosity of 15.69 % and an average Sw of 45.8 % (over the net pay). The calculated hydrocarbon height (net pay times average porosity times hydrocarbon saturation) was 1.93 m3/m2 at reservoir conditions.

Once in possession of mineralogical analyses of the sands, a new evaluation was carried out in September, 1998. The mineralogical model consisted of quartz, kaolinite, illite and siderite. Porosity calculations were performed using a probabilistic method. Calculated results of porosity were too high and resulted in a much increased value of the hydrocarbon height (3.56 m3/m2 at reservoir conditions). The problem in this evaluation was due to an overestimation of the average volume fraction of siderite in the matrix. Samples having more than 15 % siderite (in the matrix) were given weight to calculate the average amount of siderite in the sands. The excessive amount of calculated siderite (which has a density of 3.91 g/cc), resulted in high porosity values, which triggered lower values of water

saturation and a consequent increase of the 'pay'. It was immediately recognised that this evaluation was too optimistic and the reasons why it was so. However, it was forwarded to Premier Oil with the advice that it should be regarded as the 'most optimistic' case.

The present evaluation departs from the hypothesis that reservoir sands have an average of about 1 % siderite in the matrix. This approximate average results from the elimination of all the samples which have a high sideritic content. In other words, if a rock contains 15% siderite, cannot be considered as a reservoir rock.

This new evaluation estimates a "net pay" of 23.5 metres, an average porosity of 0.176 and an average Sw of 0.389. The calculated hydrocarbon height is 2.52 m3/m2.

3.0 Evaluation Method

Well logs had already been depth matched and environmentally corrected at the well site. True resistivity was calculated from the Deep and Shallow Laterologs and the MSFL, using the Crocker Data Processing package.

3.1 Porosity Estimation

Porosity calculations are based on the premise that the mineral components of the rock can only have some limited ranges. These ranges are derived from the available mineralogical analyses. The mineralogical model was reduced to four components; quartz, kaolinite, siderite and illite (in practice there are small amounts of pyrite in some samples). The ranges of the minerals were the following:

MINERAL	Minimum Volume Fraction in Matrix	Average Volume Fraction in Matrix	Maximum Volume Fraction in Matrix
Quartz	0.585	0.725	0.865
Siderite	0.00	0.01	0.02
Illite	0.02	0.07	0.12
Kaolinite	0.09	0.195	0.30

By definition, any rock outside these ranges is not considered to be a reservoir rock.

Because the actual mineralogical composition of each level which is going to be interpreted is not accurately known, there will be a degree of uncertainty in the calculated porosity. However, this is not a major problem, because in practice we are interested in porosity averages over intervals rather than in individual points. For the specific evaluation of White Ibis, the main problem is the average volume fraction of siderite that is input to the model. Because its density is so different to the other minerals, a slight increase of siderite in the model will produce a substantial increase in porosity. So, the resulting porosity values would be biased and there is no solution to the problem.

Calculation of porosity and the density of the fluid existing in the invaded zone are performed with the Neutron and Density Logs. Values of matrix density and matrix

hydrogen index are generated using the Montecarlo method, departing from the ranges shown in the table above. Only certain combinations of the mineral compositions will be able to solve the system of equations provided by the Neutron and Density logs. In many instances, there will be no solution at all (even after 5000 iterations) and the particular level is then considered not to be reservoir rock. In a sense, rather than using a fixed cut-off for porosity or clay minerals fraction, the method uses the lack of solution as a cut-off.

A more thorough explanation of the method, including the density and hydrogen index of the minerals and fluids used in the evaluation, is given in Appendix I.

3.2 Estimation of Water Resistivity

Water resistivity has been derived from an MDT water sample taken at 2079.4 metres. The analysis indicated a concentration of chlorides of 23,000 ppm. Provided that NaCl is the only salt present, the measured concentration is equivalent to a salinity of 37,922 ppm. It should be pointed out that the sample had a measured resistivity of 0.125 ohmm @ 15 C. This implies a salinity of 68,000 ppm. Calculations of Sw in levels supposed to be 100 % water saturated, or having high values of Sw, yield very low values of Sw, suggesting that the figure of 68,000 ppm is too high and most probably, erroneous. For this reason, the value of 37,922 ppm, derived from the analysis, will be taken as the 'true' salinity.

An attempt has been made to check this salinity using Pickett plots. It should be pointed out, that in clayey sands, as the ones existing in White Ibis, a Pickett plot is not strictly valid, because the Archie equation is no longer applicable. For this reason, some experiments were done to see to which extent the presence of clays could invalidate a Pickett type analysis. It was found out that the presence of clays, as expected, distorts the calculated values of Rw and m. However, there are other problems, such as the presence of residual hydrocarbons or the difference in vertical resolution between the porosity and resistivity logs that make more difficult the interpretation of Pickett type plots. It was finally decided not to use well log derived values of water salinity and stick to the value of 37,922 ppm derived from the water analysis. Details are given in Appendix II.

A value of 2 was used for the cementation factor. It was finally decided to use a standard value rather than doubtful values derived from Pickett plots (see Appendix II). The standard value of 2 was used for the saturation exponent, 'n'.

3.3 Estimation of Sw

Sw calculations were carried out using the Waxman & Smits equation. To use this equation it is necessary to know the CEC (Cation Exchange Capacity) of the clays present in the rock and their respective volume fractions.

The two clay minerals are kaolinite and illite. The range of values of the CEC's of these clays are :

CLAY MINERAL	Min CEC value (meq/g)	Max CEC value (meq/g)
Kaolinite	0.01	0.10
Illite	0.30	0.60

The evaluation was first done using the average values of the CEC's (from the table, 0.055 meq/g for kaolinite and 0.45 meq/g for illite. However, these parameters proved to yield low values of Sw in zones expected to have high Sw. For this reason, the minimum values of these parameters were finally used, that is, 0.01 meq/g for kaolinite and 0.30 meq/g for illite.

The Waxman & Smits formula (provided n=2; otherwise it is not possible to solve for Sw analitically) is:

$$Sw = \frac{-RwBQv + \sqrt{(RwBQv)^2 + \frac{4FRw}{Rt}}}{2}$$

B is a parameter which is a function of temperature and water resistivity. Qv represents charge per pore volume. The product BQv represents the conductivity supplied by the clay portion of the rock. F is the formation factor of the clean sand.

Qv is a function of the porosity, the volume fractions of the clays and their respective densities and CEC's

4.0 Results

As stated in section 3.1, no cut-off's in the clay volume or the porosity have been explicitly used. Instead, a broad definition of the reservoir sand is made in the table in section 3.1. If the system of equations cannot be solved within this range of mineral compositions, the rock is considered not to be a reservoir rock.

A cut-off of Sw>0.60 was used to separate hydrocarbon producing from water producing sands. This figure is arbitrary.

The evaluation results can be summarised in the following table:

Gross Interval (mKB)	Sand Thickness (m)	Net sand (m) (Sw<=0.60)	Average Phi (Sw<=0.60)	Average Sw (Sw<=0.60)
2001.5 – 2024.5	14.93	14.02	0.179	0.381
2044.0 – 2053.0	6.09	5.79	0.191	0.362
2128.0 – 2140.0	3.96	3.66	0.142	0.389
Total	24.98	23.47	0.176	0.389

The hydrocarbon height is 2.52 m3/m2.

Some sand levels outside these intervals have Sw's less than the 0.60 cut-off. These layers, according to the MDT have no movable hydrocarbons. They have not been included in the calculation of the hydrocarbon height.

Some of the porosity and Sw values over selected interval have been compared with the values yielded by the Schlumberger ELAN/CMR interpretation.

Interval (mKB)	Average Phi (This Eval.)	Average Phi (ELAN/CMR)	Average Sw (This Eval.)	Average Sw (ELAN/CMR)
2002.69 – 2007.11	0.154	0.141	0.326	0.34
2013.66 – 2015.95	0.171	0.155	0.446	0.51
2044.29 – 2046.28	0.158	0.145	0.351	0.40
2047.19 – 2048.86	0.195	0.177	0.290	0.340
2067.76 – 2070.05	0.154	0.142	0.70	0.80

The porosity calculated by this evaluation seems systematically higher by about 10 % than the ELAN/CMR evaluation. The Sw values are systematically 12 % lower (on average) when compared with the Schlumberger evaluation. This difference in the Sw's is triggered basically by the difference in the calculated porosity.

It should be pointed out that both this evaluation and Schlumberger's show hydrocarbons (even movable hydrocarbons in the case of Sclumberger) over zones regarded as devoid of movable hydrocarbon by the MDT. Several of these zones had gas shows in the mudlog.

It is concluded that the current evaluation is reasonable, considering the great uncertainties associated with it. It is thought that there is not a unique answer to the problem of estimating the hydrocarbon column, which will be ultimately used for volumetric calculations. The hydrocarbon column should be regarded as a random variable and the result of this evaluation should be regarded as a realisation of such a random variable.

APPENDIX I

EVALUATION OF POROSITY IN GAS BEARING SANDS USING A PROBABILISTIC APPROACH

1.0 Introduction

The gas bearing sands in White Ibis have a complex lithology. Each level in the well has six unknowns: volume fractions of quartz, kaolinite, illite and siderite, porosity and gas saturation in the invaded zone. To determine these six unknowns, six equations are necessary. However, only four equations are available: the unity equation (the porosity plus the volume fractions of the minerals must be equal to one) and the responses of the PEF, Neutron and Density Logs. The system is then undetermined and there is not a unique answer. However, several X-Ray Diffraction analyses of these sands are available. There is a broad knowledge of the range of the mineral compositions and this information can be used to supplement the shortage of equations. However, the answer to the problem (i.e., solving for the six unknowns) will not be unique and all the calculated values are subject to a certain error, which is calculated explicitly for the porosity.

In the final analysis it was decided not to include the PEF in the calculations (although it had been included in a previous evaluation). The reason for this is that even including this log, there is still a shortage of equations. Furthermore, the evaluation using only the Neutron and Density logs yielded reasonable results and it was not thought worthwhile to complicate the evaluation method including the PEF.

2.0 Description of the Method

The responses of the Density and Neutron logs are represented by the following equations:

$$\rho_b = \rho_{ma}\,(1-\phi) + \rho_{fa}\,\phi \qquad \text{(eq. I)}$$

$$\phi_N = H_{ma}\,(1-\phi) + H_f\,\phi - (1-H_f)\,(2\phi H_f + 0.04\phi) \qquad \text{(eq.II)}$$

For the Neutron Log, the term $(1-H_f)\,(2\phi H_f + 0.04\phi)$ represents the "Excavation Effect", which cannot be neglected in gas bearing sands. In the two previous equations the symbols stand for:

ρ_b : Bulk density 'seen' by the Density log.
ϕ_N : Neutron log response.
ρ_{ma} : Matrix density.
ρ_{fa} : Apparent fluid density.
H_{ma} : Matrix Hydrogen Index.
H_f : Fluid Hydrogen Index.

The two hydrogen indices depend on the amount of hydrogen in the matrix and in the fluid, respectively.

The quantities H_f and ρ_{fa} are not independent and one can be expressed as a function of the other:

$H_f = A + B\,\rho_{fa}$ (eq.III),

where A and B are constants depending on the reservoir pressure and temperature and are, in principle, known quantities. They are defined by the following equations:

$$A = H_{liq} - \rho_{liq}\frac{H_{gas} - H_{liq}}{\rho_{gasapp} - \rho_{liq}}$$

$$B = \frac{H_{gas} - H_{liq}}{\rho_{gasapp} - \rho_{liq}}$$

It should be noted that the 'apparent gas density' (as seen by the Density log) is related to the true gas density by the equation:

$$\rho_{gasapp} = 1.335\rho_{gas} - 0.188$$

The subscript 'liq' refers to the liquid phase in the pore space of the invaded zone of the rock. It will be assumed that the only liquid is water. The parameters for the fluids were taken as 0.16 g/cc for the true gas density, 0.30 for the gas hydrogen index and 1.0 for the liquid (water) density and also 1.0 for its hydrogen index.

From equations I, II and III, it is possible to eliminate H_f and ϕ and solve for ρ_{fa}:

$$\rho_{fa} = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$ (eq.IV)

In equation IV, the parameters a,b and c are defined as:

$$a = \phi_N - H_{ma} + 1.04B(\rho_{ma} - \rho_b) - 2(\rho_{ma} - \rho_b)^2 B^2$$

$$b = 2\rho_{ma}(H_{ma} - \phi_N) - (\rho_{ma} - \rho_b)(1.04B\rho_{ma} - 1.04A + H_{ma} + 0.04) + 2(B - 2AB)(\rho_{ma} - \rho_b)^2$$

$$c = \rho_{ma}{}^2(\phi_N - H_{ma}) - (\rho_{ma} - \rho_b)(1.04A\rho_{ma} - \rho_{ma}(H_{ma} + 0.04)) + 2(A - A^2)(\rho_{ma} - \rho_b)^2$$

Once the apparent fluid density is calculated in equation IV, the calculation of Sxo (the water saturation in the invaded zone) is immediate:

$$S_{xo} = \frac{\rho_{fa} - \rho_{gasapp}}{\rho_{liq} - \rho_{gasapp}}$$

However, before using equation IV to calculate the apparent fluid density, it is first necessary to know ρ_{ma} and H_{ma}.

A certain number of X-Ray diffraction analysis for the White Ibis sands are available and hence, the mineralogical composition of the sands and the range of each mineralogical component, are known.

The mineralogy of these sands is quite complex, as shown in table AI.2, provided by PREMIER. The mineralogical model had to be simplified and hence somewhat arbitratry decisions were made, in particular, what was the minimum amount of siderite a sand should have to be considered a reservoir sand. The final model consisted of quartz, kaolinite, illite and siderite (samples 1 and 2 correspond to the basement and hence have a very different mineralogy). The volume fraction in the matrix of the four minerals was recalculated to 1.0 and then averaged. Samples 28, 27, 12 and 6 were not included in the calculations. In fact, these decisions are quite critical, because if these samples are included in the average, the resulting average volume fraction of siderite in the matrix will be very high and this will trigger an erroneously high value of porosity.

The following table shows the range in the mineral compositions and the Neutron and Density responses of the four minerals. The ranges of quartz, illite and kaolinite correspond roughly to two standard deviations (as calculated from analyses). The range for siderite is arbitrary.

MINERAL	Min. Vol. Fraction	Aver.Vol. Fraction	Max.Vol. Fraction	Density (g/cc)	Hydrogen Index
Quartz	0.585	0.725	0.865	2.65	-0.03
Siderite	0.0	0.01	0.02	3.91	0.129
Illite	0.02	0.07	0.12	2.665	0.120
Kaolinite	0.09	0.195	0.30	2.61	0.45

The volume fractions refer to the solid part of the rock. Slight adjustments have been done to the average volume fractions.

Matrix density and matrix hydrogen index are calculated as follows:

$$\rho_{ma} = \sum_{i=1}^{4} x_i \rho_i \qquad \text{(eq.V)}$$

$$H_{ma} = \sum_{i=1}^{4} x_i H_i \qquad \text{(eq.VI)}$$

In these equations, x_i stands for the volume fraction in the matrix of the ith mineral and ρ_i and H_i for its density and hydrogen index.

The x's are in principle unknown quantities and are different for each depth. In practice, the x's are obtained using the Montecarlo method. Each of the mineral volume fractions are assumed to be a uniform random variable, with the minimum and maximum values given by the table above. The x's corresponding to three minerals are drawn at random from the respective distributions (the volume fraction of the fourth mineral is 1 minus the sum of the other three). These values of the x's are then used to calculate the matrix density and hydrogen index.

The computer programme which calculates ϕ and Sxo proceeds as follows:

1) Random samples of the volume fractions of the minerals are generated.
2) Using equations V and VI, ρ_{ma} and H_{ma} are calculated.
3) ρ_{ma} and H_{ma} are introduced in equation IV (through parameters a, b and c) and ρ_{fa} is calculated. However, if the argument of the square root in equation IV turns to be less than zero, the programme goes back to step 1 and generates a new mineralogical composition.
4) If a value of apparent fluid density can be calculated (i.e., the argument of the square root is greater or equal than zero), Sxo is then calculated. If Sxo is greater than 1.0 and less than 0.10 (this lower limit is arbitrary), the mineral composition is rejected and the programme goes back to step 1.
5) Porosity is calculated using equation I. If the porosity is greater than 0.35 or less than zero, the mineralogical composition is rejected and the programme goes back to step 1. If the porosity lies between 0 and 0.35, it is accepted and stored. The corresponding value of Sxo and the volume fraction of the two clays are also stored. As regards illite and kaolinite, the stored values are Vill and Vkaol (the volume fraction in the matrix times one minus the porosity).
6) The procedure is repeated till 30 valid values of porosity and Sxo are obtained.
7) Values of porosity, Sxo, Vill and Vkaol are respectively averaged. They represent the final result for that particular depth. For the case of porosity, the standard deviation of the 30 values is calculated. This provides an estimate of the uncertainty in the porosity value due to the uncertainty in the mineral composition.
8) The whole procedure is repeated for the next depth.

An example of the output of the programme for a sand between 2002.69 and 2007.11 m Kb is shown in table AI.1, which is enclosed.

570137

TABLE AI.1

DEPTH (mKB)	RHOMA g/cc	RHOF g/cc	Sxo	PHI	St.Dev.	Vkaol	Villite
2002.69	2.659	0.987	0.984524	0.109	0.0018	0.269	0.07
2002.84	2.654	0.963	0.955952	0.127	0.0034	0.246	0.066
2002.99	2.652	0.937	0.925	0.126	0.0047	0.242	0.061
2003.15	2.659	0.992	0.990476	0.121	0.0018	0.267	0.064
2003.3	2.653	0.951	0.941667	0.164	0.004	0.223	0.059
2003.45	2.655	0.952	0.942857	0.17	0.004	0.215	0.06
2003.6	2.656	0.959	0.95119	0.15	0.0035	0.238	0.068
2003.76	-999.25	-999.25	-999.25	-999.25	-999.25	-999.25	-999.25
2003.91	2.659	0.988	0.985714	0.145	0.0022	0.256	0.068
2004.06	2.654	0.942	0.930952	0.175	0.0053	0.203	0.064
2004.21	2.656	0.934	0.921429	0.168	0.006	0.204	0.054
2004.36	2.654	0.913	0.896429	0.16	0.0085	0.193	0.056
2004.52	2.653	0.909	0.891667	0.155	0.0079	0.194	0.059
2004.67	2.658	0.899	0.879762	0.155	0.0073	0.19	0.062
2004.82	2.655	0.91	0.892857	0.149	0.007	0.202	0.061
2004.97	2.654	0.906	0.888095	0.132	0.0058	0.223	0.062
2005.13	2.654	0.912	0.895238	0.121	0.0053	0.231	0.059
2005.28	2.653	0.889	0.867857	0.113	0.0065	0.233	0.065
2005.43	2.661	0.994	0.992857	0.113	0.0012	0.269	0.07
2005.58	2.657	0.892	0.871429	0.172	0.0075	0.178	0.059
2005.74	2.653	0.907	0.889286	0.178	0.006	0.194	0.061
2005.89	2.652	0.93	0.916667	0.185	0.0058	0.188	0.057
2006.04	2.653	0.942	0.930952	0.187	0.0054	0.204	0.057
2006.19	2.655	0.945	0.934524	0.183	0.0055	0.212	0.056
2006.35	2.655	0.932	0.919048	0.186	0.0063	0.199	0.059
2006.5	2.655	0.932	0.919048	0.177	0.0051	0.211	0.063
2006.65	2.654	0.946	0.935714	0.168	0.0044	0.228	0.063
2006.8	2.654	0.969	0.963095	0.156	0.0036	0.241	0.061
2006.96	2.655	0.975	0.970238	0.166	0.0036	0.241	0.065
2007.11	2.659	0.991	0.989286	0.158	0.0018	0.255	0.065

P.03
22-09-98 17:09
07 32010292
07 32010292
K R MARTIN P/L

TABLE AI.2

570138

WHITE IBIS-1 PETROLOGICAL ANALYSIS
PRELIMINARY REPORT - 3

QUANTITATIVE XRD ANALYSIS - WHOLE ROCK

SWC	Depth	Quartz	Dickite	Kaolin	Illite/mica	Illite/smec	Chlorite	Calcite	Dolomite	Ankerite	Siderite	Pyrite	K-feldspar	Barite
29	1977.4	92.0	-	5.0	2.4	-	-	-	-	-	0.2	0.4	-	-
28	1982.3	48.8	13.9	11.0	9.0	-	-	-	-	-	16.7	0.9	-	-
27	1986.3	63.4	4.0	11.0	4.7	-	-	-	-	-	16.7	0.6	-	-
24	2003.6	63.5	12.0	5.5	6.8	-	-	1.2	-	-	0.3	0.9	-	9.8
23	2006.0	74.0	15.0	6.5	3.9	-	-	-	-	-	0.2	-	-	-
22	2008.5	64.9	20.6*	-	12.4	-	-	-	-	-	2.0	-	-	-
21	2011.4	71.0	16.2	6.0	5.9	-	-	-	-	-	0.9	-	-	-
20	2015.3	71.0	15.7	7.0	4.8	-	-	-	-	-	1.4	-	-	-
19	2016.7	76.0	15.0*	-	7.0	-	-	-	-	-	-	2.0	-	-
18	2024.2	67.0	19.2	6.9	5.9	-	-	-	-	-	0.9	-	-	-
15	2046.0	74.0	18.4*	-	7.1	-	-	-	-	-	-	-	-	-
14	2049.0	81.0	9.0	3.0	7.0	-	-	-	-	-	-	-	-	-
13	2052.9	69.0	15.0	7.4	9.0	-	-	-	-	-	-	0.3	-	-
12	2058.8	37.7	10.9*	-	7.1	-	-	-	-	-	44.3	-	-	-
10	2080.2	76.0	15.0	1.0	8.0	-	-	-	-	-	-	-	-	-
8	2106.6	67.2	22.8*	-	8.6	-	-	-	-	-	1.2	-	-	-
6	2130.9	48.5	10.9*	-	17.4	-	-	-	-	-	23.2	-	-	-
4	2152.3	67.0	13.7	8.6	10.0	-	-	-	-	-	-	-	-	-
2	2170.2	6.7	-	-	-	-	21.0	-	29.0	37.8	3.6	0.7	1.0	-
1	2180.1	10.9	-	1.0	7.0	18.7	-	-	7.6	4.2	18.5	0.3	31.9	-

No. 671

* Denotes preliminary results in which all kaolin clay has been calculated as dickite, but samples may contain both dickite and kaolinite.

APPENDIX II

REMARKS ON THE ESTIMATION OF WATER RESISTIVITY

When no water samples are available, water resistivity has to be estimated either from Pickett plots, the SP curve, or the comparison of Rt (true resistivity) and Rxo (resistivity of the invaded zone). When sands contain significant amount of clays, these estimates become less reliable.

An experiment was done to see to which extent the presence of clays affects the calculation of Rw and 'm' (cementation factor) from Pickett plots.

The idea consisted in generating a theoretical true resistivity curve over a short sand interval, where the porosity and clay volume fractions for each point in the interval correspond to those of the sand between 2152 and 2154 mKB. To generate this synthetic resistivity curve, Sw was assumed to be equal to 1 for all the points. Then, the resistivity curve was calculated by means of the Waxman & Smits equation, using an Rw of 0.067 ohmm and a cementation factor of 2.

The logarithm of the calculated Rt vs the logarithm of porosity were then plotted (Figure AII.1) and Rw and m were calculated back by means of the least squares method. The values of these parameters were 0.100 ohmm and 1.6189, which are quite different to the original (and 'true') input parameters, which were 0.067 ohmm and 2, respectively.

This experiment is just an indication that parameters determined from Pickett plots may not be reliable in the presence of clays.

Figure AII.2 is an actual Pickett plot over the interval 2152-2154 mKB. It should be noted that the dispersion of the data is much greater than in the simulated example. It is thought that the additional dispersion is due to the following factors:

a) The zone is not really 100% water saturated. There are variable amounts of residual hydrocarbons.
b) The vertical resolution of the porosity logs and the resistivity logs is different.

Although the parameters derived from this plot seem reasonable for Rw and m (0.098 ohmm and 2.123, respectively), the presence of clays, plus the two factors mentioned above, make these results unreliable. However, they would have been used if a water sample were not available. It should be noted that if an Rw of 0.098 ohmm (corresponding to a salinity of 24,750 ppm) and an 'm' equal to 2.123 had been used, the interval between 2128 and 2140 metres would have had very high water saturations, incompatible with the MDT results.

570140

5 cm

TESTING CLAY EFFECT ON PICKETT PLOTS

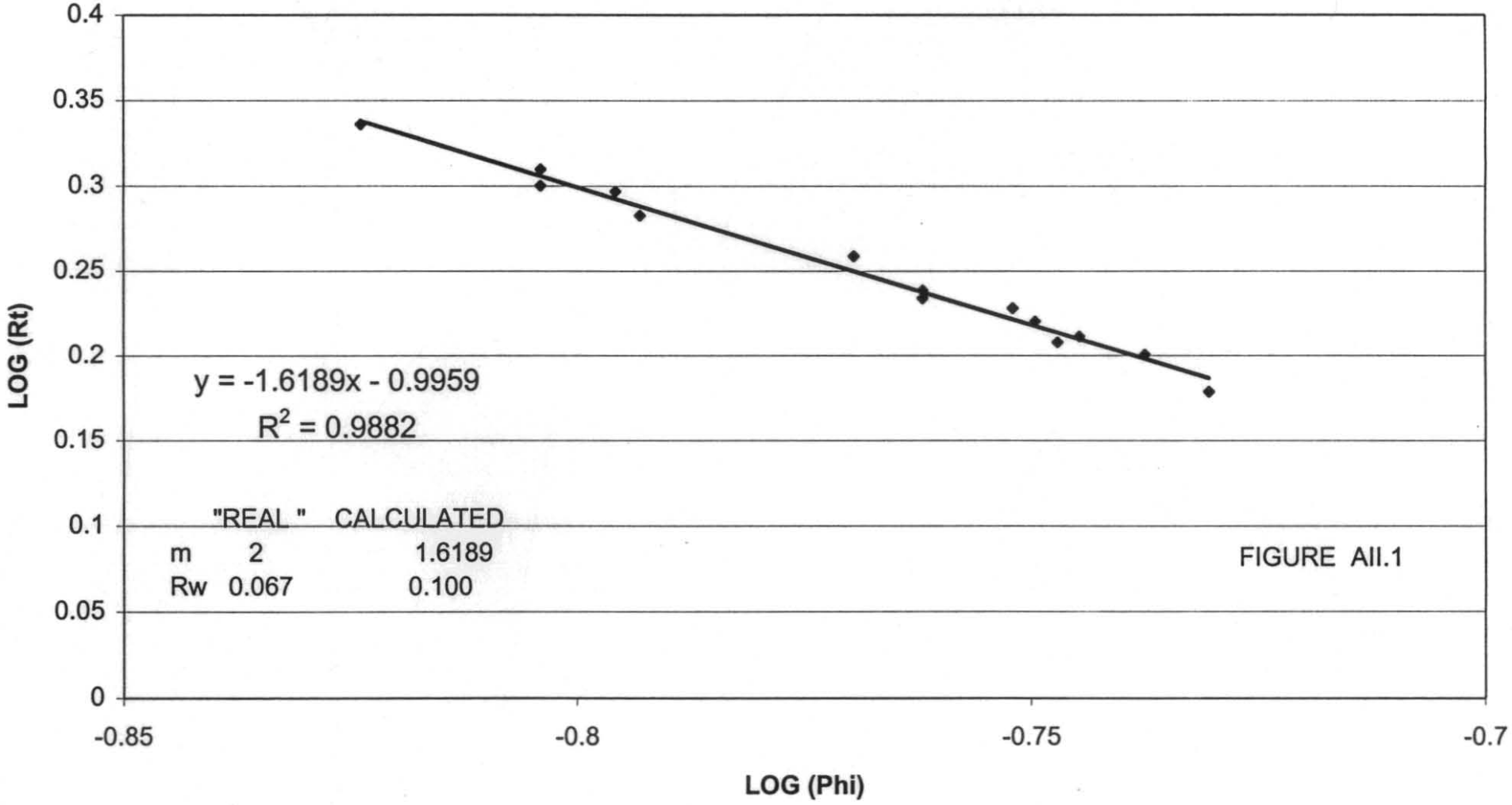


FIGURE AII.1

5 cm

WHITE IBIS: Pickett Plot over Interval

2152 - 2154 mKB

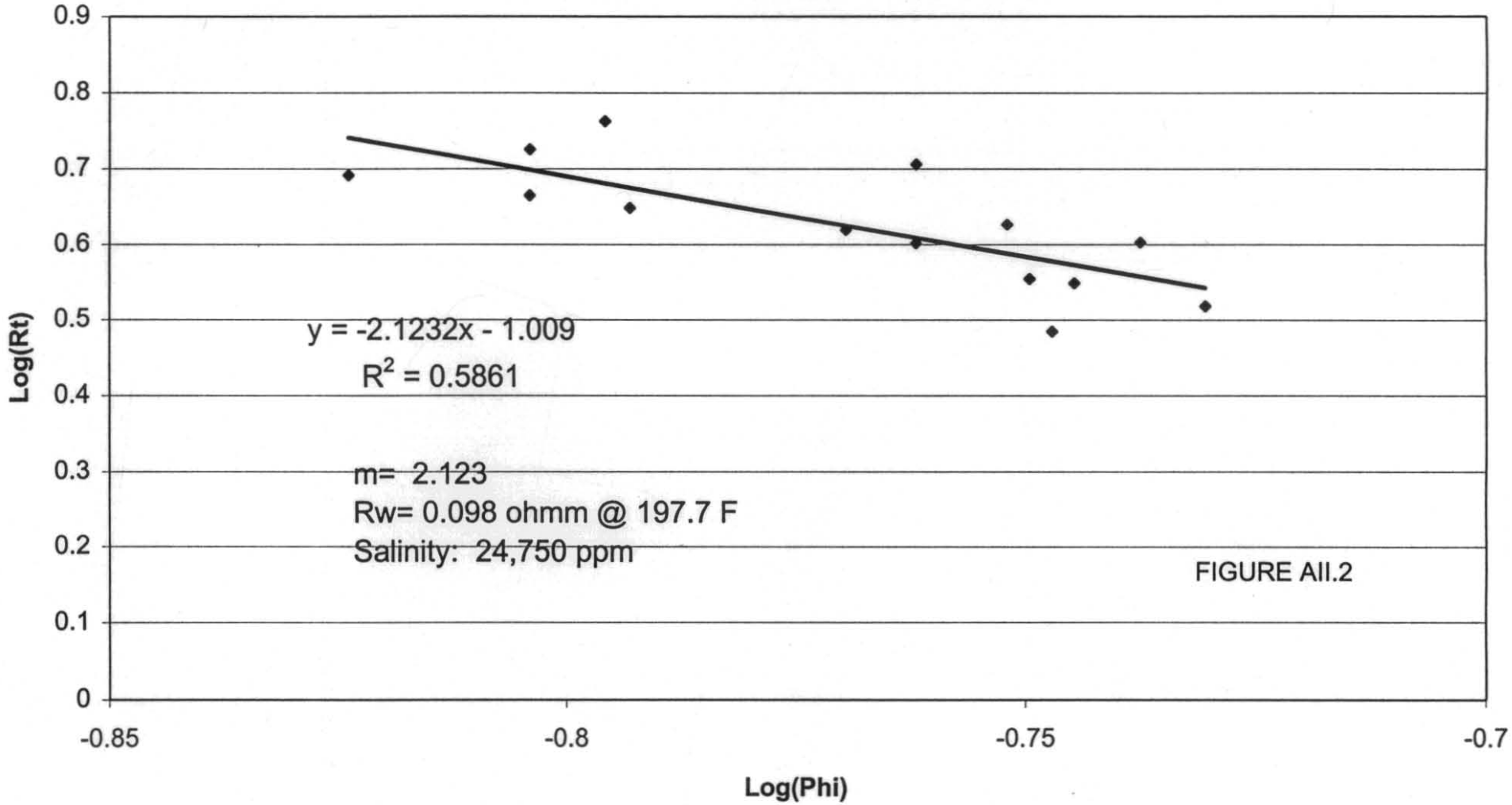
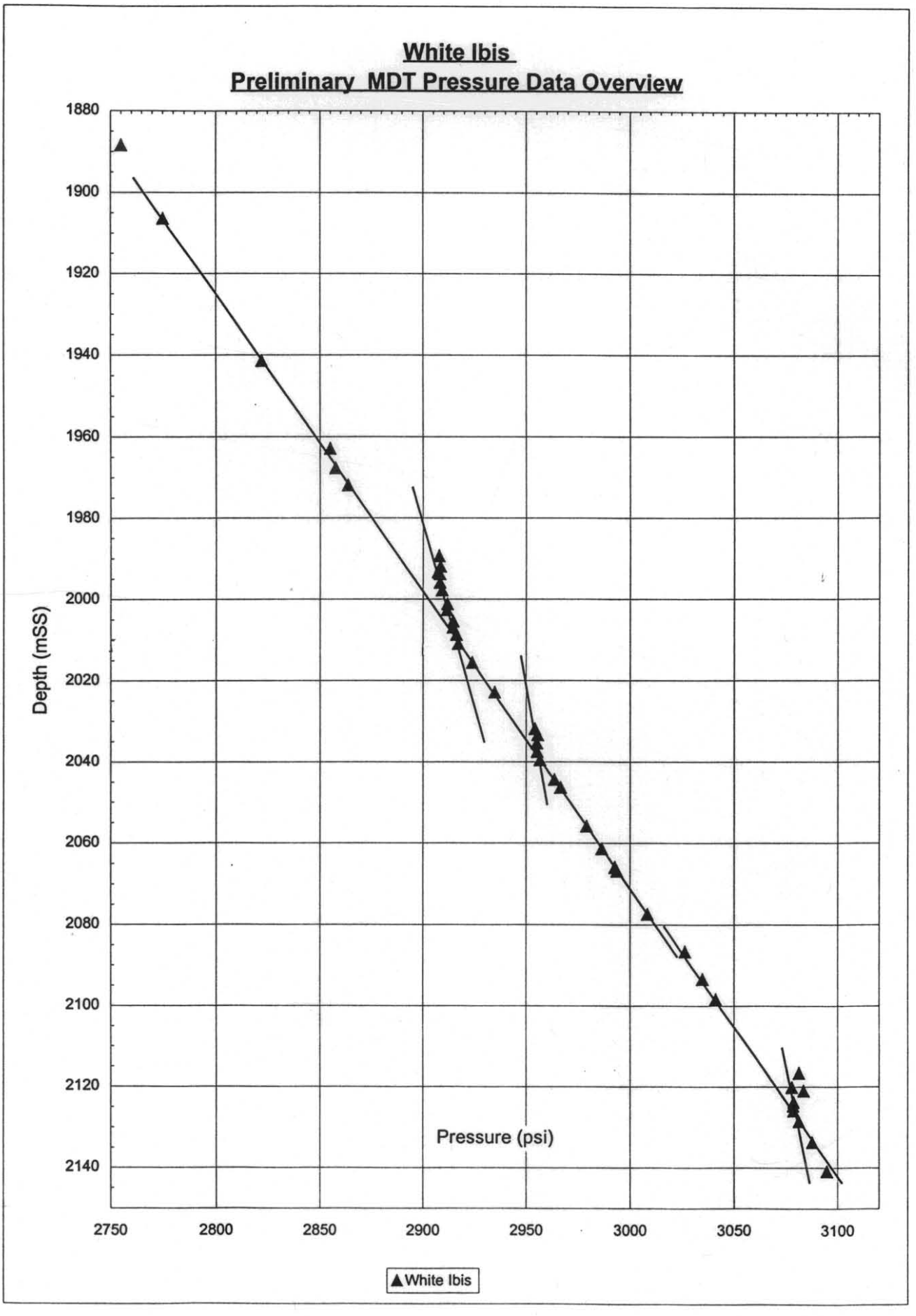


FIGURE AII.2


White Ibis
Preliminary MDT Pressure Data Overview
Depth (mSS)
1880
1900
1920
1940
1960
1980
2000
2020
2040
2060
2080
2100
2120
2140
Pressure (psi)
2750
2800
2850
2900
2950
3000
3050
3100
White Ibis
5 cm

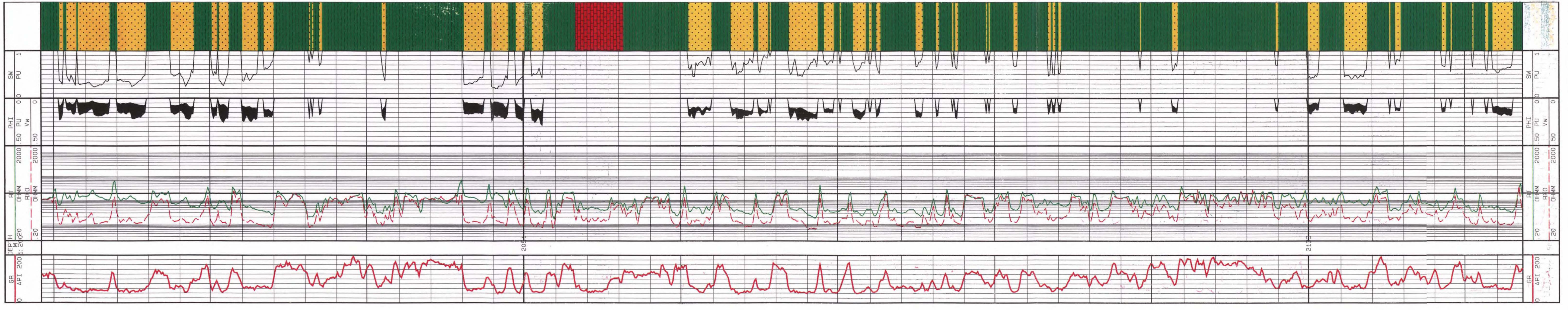
OR-046/

570143

WHITEIBIS

5 cm

ENCLOSURE/. Appx 7



570144

Evaluation of White Ibis

Submitted to
Premier Oil Australasia

July 1998

Prepared by
IKODA Pty Ltd.
41-43 Ord Street,
West Perth 6005,
Western Australia

Telephone: 61-(0)8 9322 5612
Facsimile: 61-(0)8 9322 1216

IKODA
PTY LTD

WHITE IBIS: WELL LOG EVALUATION

1.0 Executive Summary

A well log evaluation of White Ibis has been carried out using the Crocker Data Processing Package (silty shaly sand model). According to the model, most of the sands between 2000 and 2155 m md contain hydrocarbons. The zones where the sands are relatively thick and have low water saturations, roughly coincide with the hydrocarbon zones determined by the MDT. According to this tool, there are three separate hydrocarbon accumulations between 2000 and 2155 m, whilst the logs 'see' all the sands in this interval as hydrocarbon bearing. However, the water saturation of sands outside the hydrocarbon zones determined by the MDT are generally high, and cannot be regarded as pay. The net effective pay of the three hydrocarbon zones determined by the MDT is 22.7 m, while the net effective pay for the interval 2000 m – 2155 m is 25.9 m. The MDT and well log results differ by 13 %,

2.0 Estimation of Water Resistivity

The water resistivity has been estimated using the following procedures:

a) From Resistivity vs Porosity crossplots over intervals assumed to be 100 % water saturated.
b) From a water sample.

Figure 1 is a crossplot of the logarithms of resistivity and porosity for sands in the interval 1880m – 1960 m. Water resistivity has been calculated using the least squares method, assuming that the value of 'm', the cementation factor, was equal to its standard value in sands, 1.8. The calculated value of Rw was 0.0674 ohmm @ 83.5 C. This is equivalent to a salinity of 42,700 ppm. The straight line represents the equation $\text{Log}(Rt) = \text{Log}(Rw) - m\,\text{Log}(\phi)$, with m=1.8 and Rw=0.0674 ohmm.

A water sample taken from 2079.4 m had 23,000 ppm of chlorides and a measured resistivity of 0.293 ohmm @ 15 C. The value from the analysis implies a salinity of 37,922 ppm, whilst the measured water resistivity corresponds to a salinity of 26,400 ppm. It was decided to discard the measured resistivity and use the analysis result instead, due to the similarity to the value derived from the crossplot.

As a further check, the average value of the quotient Rt/Rxo, over the interval 1880 m – 1960 m, was determined (for sand points). A value of Rw was then calculated using the formula

$$Rw = Rmf \times Rt/Rxo$$

The calculated value of Rw was 0.088 ohmm @ 83.5 C, corresponding to a salinity of 30,400 ppm. This value is just indicative of the order of magnitude of Rw. However, it is close enough to the water analysis result of 37,922 ppm Hence, a salinity of 37,922 ppm for the formation water, was used in Sw calculations.

3.0 Well Log Evaluation

The silty shaly sand model of the Crocker Data Processing package, was used in the well log evaluation. The following parameters were used:

Shale resistivity: 12 ohmm
Gamma Ray (clean sand): 40 API units
Gamma Ray (shale) : 170 API units
Shale Density: 2.60 g/cc
Shale Neutron response: 0.40

The following cut-offs to discriminate 'pay' were applied:

Vsh: < 0.30
Phie: >0.05
Sw: <0.60
Minimum bed thickness: 0.5 metres

The silty shaly sand model uses the Indonesia equation to calculate Sw.

The gross sand over the three hydrocarbon bearing intervals determined by the MDT is 28.65 m, while the net effective pay is 22.71 m. The average porosity and Sw are 15.69 % and 45.76 %, respectively. The hydrocarbon column (hydrocarbon volume at reservoir conditions per unit area) is 1.93 cubic metres per square metre.

A detailed table is enclosed , with the net pay, average porosity and average Sw for the three hydrocarbon zones determined by the MDT.

4.0 Evaluation using the Sonic Log

The evaluation of this well with the silty shaly sand model of the Crocker package, has been carried out with the Neutron, Density and Gamma Ray logs. Although the programme has the option of incorporating the Sonic log, it has not been used because the presence of even small amounts of gas in relatively porous rocks, greatly distorts the response of the sonic log.

Figure 2 shows the effect of the sonic log on water and gas bearing rocks. This plot has been prepared using the Gassmann equation. Some published correlations have been used to estimate the shear wave velocity (a factor in the Gassmann equation). Note that the figure should be used as an indicative tool, because it is just an approximation. We do not know the actual mechanical properties of the sands in White Ibis.

Let us assume that we have a water bearing rock (Sw=1) with a porosity of 21%. The sonic response of such a rock would be 83 microsec/ft (see Figure 2). Now, consider a rock having a sonic response of 83 microsec/ft, but having an Sw of 0.95. According to Figure 2, the porosity would be 19%. If we do not know that the rock contains a small amount of gas, we would assume that the porosity of the rock is 21%, which is a substantial (and biased) error.

In practice we cannot use the Gassmann equation because we do not know the shear wave velocity and we use instead the Wyllie equation. To account for the gas effect, one has to manipulate ΔTfluid in order to decrease calculated porosities. The procedure is really very arbitrary, because we do not know which should be the value of ΔTfluid which determines the 'true' porosity, The basic problem is that the Wyllie equation is empirical and was established in water bearing rocks. The linear relationship between porosity and ΔT is in reality no longer valid for gas bearing rocks.

The problem with the sonic log in gas sands is that we not only overestimate porosity, but we underestimate Sw as well, particularly in those marginal zones where the resistivity is relatively low. So we run the risk of calculating an excessive hydrocarbon pore volume and because of the underestimation of the Sw, we can incorporate as 'pay', zones which in reality are above the cut-off.

WHITE IBIS: Tabulation of results

Gross Int.	Sand Int.	Sand Thick.	Net Pay (m)	Aver.Phi %	Aver.Sw %
2001.5 to 2024.5 m	2001.62 to 2002.38 m	0.76 m	0.46 m	18.95	39.60
	2002.69 to 2007.41 m	4.72 m	4.57 m	13.72	40.71
	2007.87 to 2011.22 m	3.35 m	3.35 m	15.25	44.06
	2013.51 to 2016.71 m	3.20 m	2.29 m	15.29	50.91
	2017.78 to 2019.76 m	1.98 m	1.52 m	19.46	46.21
	2021.13 to 2022.50 m	1.37 m	1.37 m	20.38	47.55
	2022.65 to 2024.48 m	1.83 m	0.30 m	17.85	56.68
2044.0 to 2053.0 m	2044.14 to 2046.43 m	2.29 m	2.29 m	14.21	42.91
	2047.19 to 2049.02 m	1.83 m	1.83 m	16.83	38.20
	2049.78 to 2050.69 m	0.91 m	0.91 m	18.91	46.16
	2051.30 to 2052.07 m	0.76 m	0.61 m	20.99	56.77
2128.0 to 2140.0 m	2129.03 to 2129.79 m	0.76 m	0.15 m	10.90	56.75
	2132.53 to 2134.06 m	1.52 m	0.91 m	13.89	52.08
	2134.51 to 2135.12	0.61 m		8.77	100.0
	2136.19 to 2138.93 m	2.74 m	2.13 m	13.15	55.97
Totals Net Pay		28.65 m	22.71 m	15.69	45.76

5 cm

WHITE IBIS: Estimation of Rw

Sands over Interval 1880 - 1960 m

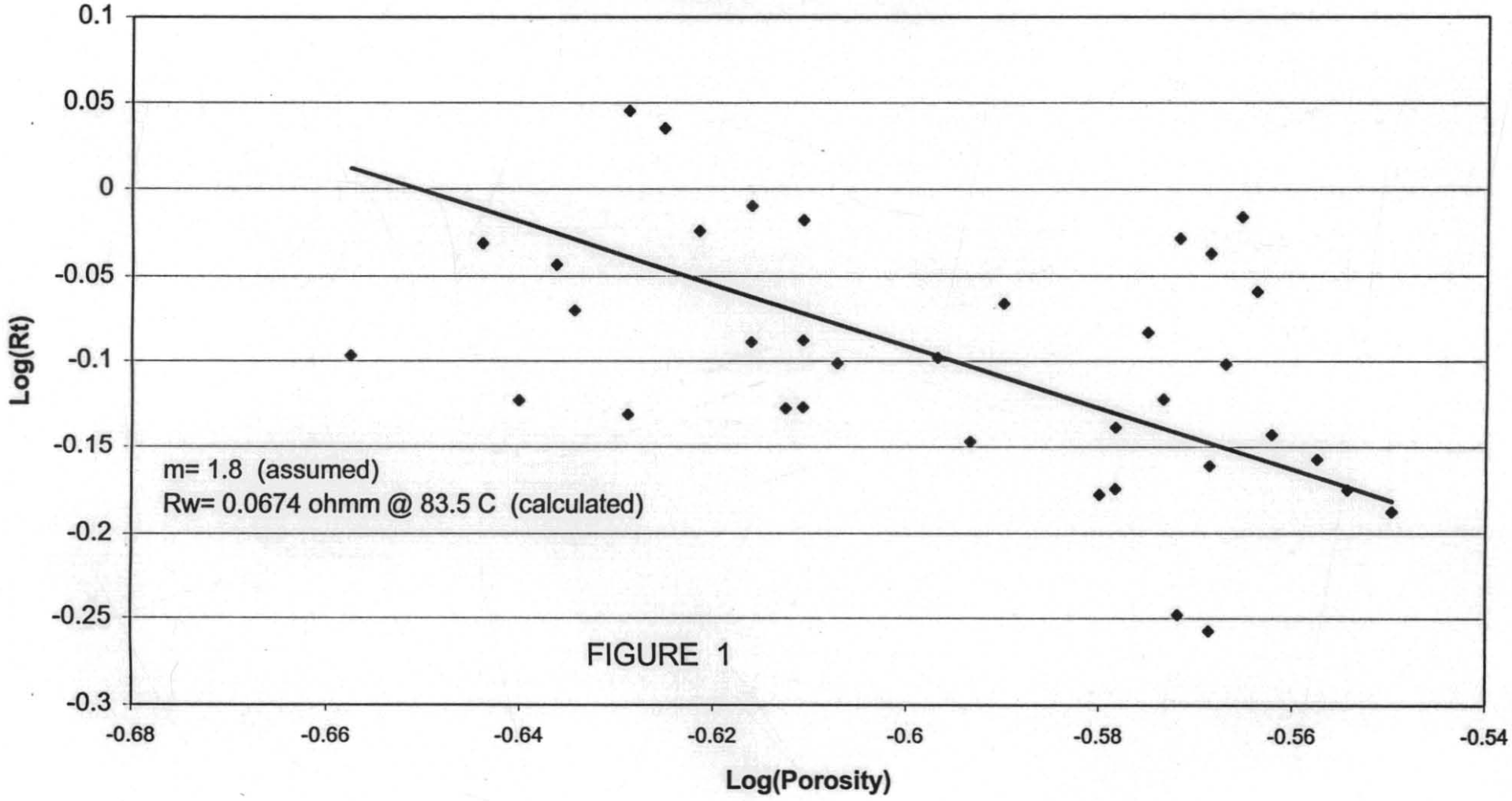


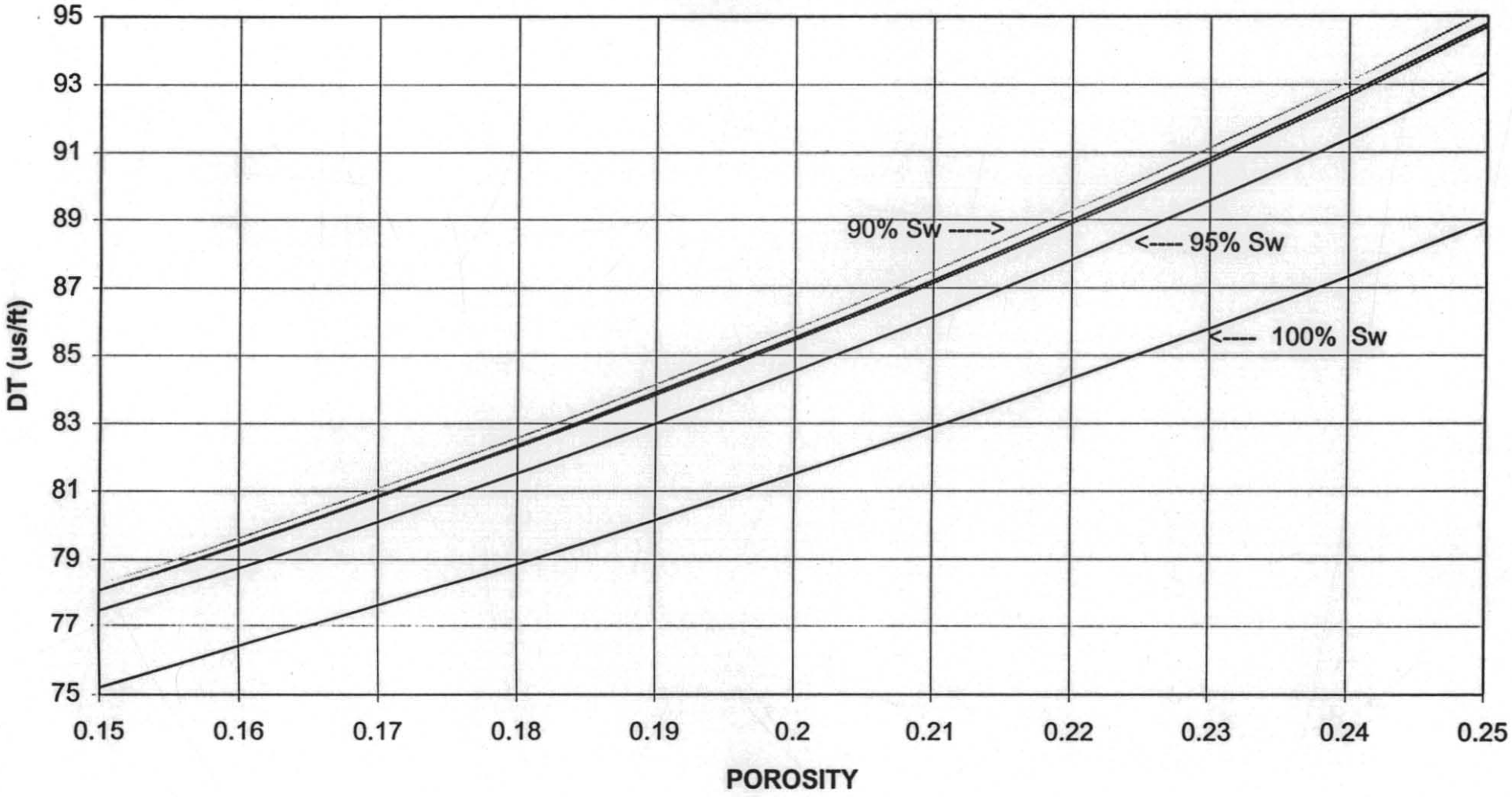
FIGURE 1

570150

5 cm

GAS EFFECT ON THE SONIC LOG

FIGURE 2



870151

ANNEXURE 2 PART 7

OIL SHALE
IKODA

5 cm

COMPUTER PROCESSED LOGS

SILTY SHALY SAND MODEL

Company	
Well Name	WHITE
Field	
Country	
State	
Province	
Permanent Datum	MSL
Elevation of KB	
Elevation of DF	12.50 M
Elevation of GL	
Elevation of RT	
Elevation Ground l>	
Log Measured from	
Drilling Measured from	
Services	
Other Services 1n 1	
Service company	
Run number	
Log computed	09-07-98
Date plotted	13-07-98
Time plotted	14.26.01

PETROLOG SOFTWARE Revision 6.20

CROCKER WELL PRODUCTS

Run number

COMPUTATION PARAMETERS

DEPTH INTERVAL	Rw	TEMP	GR MIN	GR MAX	R CLAY	PHDN CLAY	PHSN CLAY	RHMA	a	m	n
1875.0 - 2156.0	.071	88.0	40	170	12	2.60	.400	100	2.65	1.00	1.80	2.00

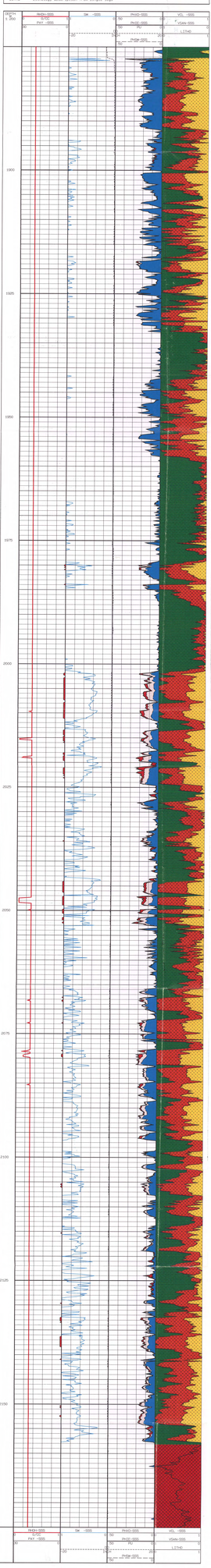
Since well log interpretations are opinions based upon inferences from well logs, we cannot and do not guarantee the correctness or accuracy of any interpretation. Therefore we shall not be liable or responsible for any loss, damage, cost or expense incurred or sustained by anyone resulting from any interpretation.

LITHOLOGIES

SOIL	GAS	MIXED OIL
MIXED GAS	Shales	Silts
Igneous	Water	Sand Stone

LOG DESCRIPTION

RHOH-SSS Apparent Hydrocarbon Density, SSS Model
Sw -SSS Water Saturation, SSS Model
PHID-SSS PHID(HID, SSS Model)
PHIS-SSS PHIS(Shale Porosity), SSS Model
CBW Calcium-Bicarbonate
PHIM-SSS PHIM(M, SSS Model)
VCL -SSS Vclay SSS Model
VSAN-SSS Volume of Sand, Two Water Model
LITHO Lithology Flag, Variable output flag (Salt, Trona, Anhydrite, Gypsum, Coal)
PAY -SSS Pay Flag, SSS Model
LITHO Lithology description from single logs



APPENDIX 8

MDT ANALYSIS

WHITE IBIS 1

Premier Oil Australasia

WIRELINE LOGGING – MDT (PRESSURE) REPORT

WELL NO: White Ibis-1
DATE: 16-17/5/1998

CONTRACTOR: Schluberger
ENGINEER: Y. Frans
WITNESS: Fontaine/Frankiwitz

WELL NO: White Ibis LOG NO: One
DEEPEST SURVEY DATA
DEPTH: MD: TVD: ANGLE: DEG:

LOG TYPE: MDT
REFERENCE LOG: PEX/AS
REFERENCE LOG NO: One

TEST NO.	DEPTH		HYDROSTATIC PRESSURE		SET TOOL	FORMATION PRESSURE		RETRACT TOOL	HYDROSTATIC PRESSURE		DRAW DOWN	MOBILITY mD	TEMP ^{0}C
			BEFORE TEST						AFTER TEST				
	MEASURED	TRUE VERTICAL	STRAIN	HP		STRAIN	HP		STRAIN	HP			
			PSIG	PSIA	TIME	PSIG	PSIA	TIME	PSIG	PSIA	PSI		
1	1976.0		3354.4	3367.5		-	-		3354.9	3367.39	14	Tight	101.9
2	1975.5		3353.1	3366.63		2842.7	2854.87		3353.7	3366.22	853	3.1	102.3
3	1979.8		3361.5	3373.54		-	-		3361.4	3372.51	20	Tight	102.9
4	1980.7		3362.6	3374.37		-	-		3362.5	3373.6	32	Tight	103.4
5	1980.3		3361.9	3373.48		2846.4	2857.56		3361.4	3372.73	2851.0	946.7	103.6
6	1981.5		3363.8	3375.12		-	-		3363.8	3374.62	34	Tight	103.9
7	1984.5		3368.2	3379.71		28532.0	2863.68		3368.2	3378.97	2820.5	121.8	105.1
8	2002.0		3396.7	3407.71		2897.0	2907.72		3396.5	3407.37	2757.2	36	105.1
10	2004.5		3400.6	3411.35		2897.7	2908.39		3400.5	3411.1	2739.6	36.9	105.2
11	2006.4		3403.6	3414.55		2897.3	2908.08		3403.6	3413.9	2805.1	60.1	105.3
12	2008.5		3406.7	3417.48		2897.4	2908.2		3406.5	3417.43	2544.1	15.2	105.4
13	2010.4		3409.6	3420.32		2898.4	2909.17		3409.4	3420.08	2791.1	50.9	105.5
14	2013.8		3415.1	3426.03		2900.8	2911.76		3414.7	3425.7	2714.2	30.4	105.6
15	2015.2		3416.8	3427.80		2900.7	2911.63		3416.7	3427.83	2839.0	77.2	106.0
16	2018.0		3421.5	3432.48		2903.4	2914.49		3421.4	3431.83	2562.3	18.2	106.5
17	2019.5		3423.7	3434.80		2903.4	2914.52		3423.4	3434.5	2841.8	71.8	106.6
18	2005.8		3401.3	3412.14		2896.6	2907.33		3400.6	3411.95	2861.4	140.3	106.1
19	2021.3		3426.0	3437.27		2904.8	2916.16		3425.8	3437.25	2888.7	253.0	106.1

570453

20	[illegible].5		3429.2	344.83		2905.5	2917.08		3429.3	344.76	2724.0	34.9	106.[illegible]
21	2028.2		3436.7	3448.46		2912.1	2923.77		3436.6	3448.16	2819.1	63.1	106.8
22	2035.5		3448.4	3460.38		2923.1	2934.85		3448.2	3460.14	2781.8	41.7	108.1
23	2044.5		3462.8	3474.77		2942.5	2954.25		3463.1	3474.68	28-7.5	45.3	107.8
24	2046.0		3465.4	3477.33		2943.9	2955.63		3465.1	3476.85	2689.1	25.2	108.1
25	2048.0		3468.5	3480.25		2943.5	2955.18		3468.2	3480.07	2936.61	339.8	108.4
26	2050.1		3471.6	3483.92		2943.7	2955.38		3471.1	3483.35	2849.0	48.0	108.4
27	2052.2		3475.1	3486.82		2944.9	2956.68		3479.8	3486.55	2877.7	87.9	108.5
28	2057.0		3482.5	3494.43		2951.7	2963.51		3482.3	3494.12	2677.4	23.0	108.7
29	2059.0		3485.6	3497.70		2954.8	2966.52		3485.4	3497.29	2087.7	5.3	109.1
30	2068.5		3501.0	3513.00		2967.1	2978.89		3501.0	3512.65	2810.5	38.9	109.2
31	2074.0		3509.5	3521.58		2974.6	2986.38		3509.8	3521.73	2449.6	11.5	109.5
32	2078.5		3517.0	3528.87		2980.8	2992.69		3517.1	3529.0	2941.8	134.9	109.7
33	2079.4		3518.3	3530.51		2981.7	2993.64		3518.3	3530.34	2971.1	266.2	109.8
34	2090.0		3535.8	3547.91		2998.4	3008.42		3535.9	3546.9	2709.3	28.0	110.1
35	2099.2		3563.19	3551.2		3014.7	3026.60		3551.4	3563.44	1783.8	1.1	110.4
36	2106.0		3561.8	3523.69		3023.0	3035.02		3562.0	3574.15		9.7	110.8
37	2111.0		3570.8	3583.07		3029.5	3041.4		3571.0	3583.07	1921.1	3.8	111.2
38	2118.6		3583.0	3595.0		-	-		3583.3	3597.31	1514.9	Tight	111.1
39	2129.2		3601.3	3613.12		3069.2	3081.23		3600.7	3612.71	1749.5	2.0	111.3
40	2132.7		3607.0	3618.98		3065.8	3077.79		3606.6	3618.65	2829.7	34.4	111.5
41	2133.6		3609.2	3620.44		3071.4	3083.49		3608.6	3620.65	1416.9	1.4	111.7
42	2136.4		3613.4	3625.58		3066.5	3078.59		3613.6	3625.54	2653.4	13.9	111.8
43	2137.3		3614.8	3626.88		3066.2	3078.35		3614.2	3626.18	2458.1	10.0	111.9
44	2138.5		3616.5	3629.49		3066.5	3078.59		3616.7	3628.75	2610.4	12.9	112.0
45	2141.1		3621.2	3633.34		3069.2	3081.33		3621.1	3633.44	1577.85	2.8	111.9
46	2146.3		3630.1	3642.42		3075.6	3087.80		3629.5	3642.3	2784.94	21.3	112.4
47	2153.5		3642.1	3653.62		3082.7	3094.89		3641.3	3654.6	3030.18	76.5	112.3
48	2129.6		3602.3	3614.69		-	-		3601.9	3614.0		Tight	

570154

49	91.0		3219.1	3232.09		2791.9	2754.97		3218.[illegible]	3231.73	2704.6	124.7	103
50	1919.0		3248.7	3261.97		2762.2	2775.09		3248.8	3261.71	2762.2	558.7	104.1
51	1954.0		3306.5	3320.06		2809.2	2822.14		3306.3	3319.79	2798.0	229.4	104.9
MDT													
	2006.0		3400.3	3410.80		2895.8	2907.40						
	2006.0		3397.7	NA		2895.5	2907.15						
	2015.2		3411.0	NA		2899.1	NA		3411.07	NA			
	2048.5												

570155

PREMIER OIL
AUSTRALIA

WHITE IBIS
GEOSERVICES

DATE: 28-6-98

MDT SAMPLES: CHROMATOGRAPH ANALYSES

1. 2015.2 mRT

	C1	C2	C3	IC4	nC4	iC5	nC5 (ppm)
A	69161	10626	4907	2013	1432	653	196
B	69148	9880	3576	1165	5200	260	85
Avc	69155	10253	4242	1589	3316	457	141

CO2 = 3%
H2S = 0%

2. 2079.4 mRt

	C1	C2	C3	IC4	nC4	iC5	nC5 (ppm)
A	102595	14792	4574	1722	831	466	280
B	98114	13319	4060	1551	747	416	220
Avc	100355	14056	4317	1637	789	441	250

CO2 = 3%
H2S = 0%

570157

VXP494.doc

MDT AND FLUID ANALYSIS FOR THE 2002 SAND IN WHITE IBIS 1

PERMIT T/18P, BASS BASIN

Patrick McCarthy
Senior Petroleum Engineer

And

Richard Suttill
Staff Geologist

Boral Energy Resources Limited
October 1998

Contents

1. Summary and Conclusions

2. Operational Aspects of the MDT

3. MDT Gradient Analysis

4. Fluid Sampling and Analysis

5. Equation of State Calculations for Fluid Properties

6. In Situ Fluid Densities

7. Log and Mudlog Information on In Situ Fluid Type

Tables

1. Summary Results on White Ibis 1 MDTs

2. Compositional Analysis of the Fluid Sample from 2015.2mKB

Figures

1. Mud Pressure from the MDT Gauge Vs Depth

2. MDT Gradient Analysis in the 2002 Sand

3. Petrolab Graph of Retrograde Liquid Deposit Vs Pressure

4. Log Analysis and Mudlog Gas Ratios in the 2002 Sand

Appendix

Appendix 1: Comment on September 1998 Interpretation of the 2002 Sand Fluids by Premier/Fekete

1. Summary and Conclusions

The 27/6/98 MDT data and analysis of the MDT fluid sample from 2002.7mss were reported in the September 1998 report "White Ibis MDT Results" by Premier's consultant, Fekete Australia Pty Ltd. Boral Energy has reviewed the 2002 Sand data and concluded the following:

1. Laboratory analysis and equation of state calculations indicate that the gas sampled at 2002.7mss has a dewpoint pressure equal to the reservoir pressure of 2011.63 psia. ie The gas is at dewpoint in the reservoir.

2. There is a strong likelihood of a volatile oil leg in equilibrium with the gas reservoir, supported by log and mud log indications and an MDT gradient much higher than the 0.299 psi/m gas gradient.

3. The free water level is most likely 2011mss, but could be slightly shallower (perhaps 2010mss).

4. The gas-oil contact (GOC) is most likely 2003mss. The GOC cannot be shallower unless the 2002.7mss gas sample is invalid, which is unlikely. The GOC could only be significantly deeper if the oil gradient exceeds 0.75 psi/m, which is unlikely because equation of state calculations suggest an oil gradient around 0.6 psi/m.

5. The most likely properties of the gas at initial pressure are Bg = 0.0056 rcf/scf and density = 0.21 g/cc. For rigorous condensate calculations the Petrolab results need to be considered in detail because of the retrograde behaviour. For broad reserves calculations 60 stb of condensate (54.3° API gravity) per MMscf may be assumed.

6. Oil properties can only be roughly estimated using equation of state calculations. A possible set of properties at initial pressure, suitable for broad reserves calculations, is Bo = 2.76 rb/stb and density in the range 0.41 to 0.53 g/cc. GOR may be around 2425 scf/stb and the oil gravity around 55° API.

2. Operational Aspects of the MDT

No unusual events that would impact the MDT pressure gauge accuracy or operation in the 2002 Sand were reported to Boral Energy.

Figure 1 shows the plot of MDT – measured mud pressure versus depth, which looks fine. Also the difference between the strain and HP gauge measurements, shown along with other summary data in Table 1, is fairly consistent at 11 to 13 (14.7 psi difference is expected since the HP gauge reads absolute pressure). Therefore it is likely that the HP gauge was reading reliably with repeatability within 1 psi.

All the points from 2002 to 2036 mKB (ie all those in the 2002 Sand) had mobilities exceeding 15md/cp, mostly over 30md/cp (Table 1), so supercharging is not very likely.

3. MDT Gradient Analysis

Figure 2 shows the MDT gradient analysis. The gradient at any depth in the hydrocarbon reservoir is that due to the density of the non-wetting phase, and below the free water level the gradient is that due to water density. In the gas cap the gradient is 0.299 psi/m and in the water the gradient is 1.40 psi/m as discussed in Section 6 – there is a few percent uncertainty in these gradient figures but no more than that.

There is considerable uncertainty in the oil gradient since there is no sample. Equation of state calculations suggest about 0.6 psi/m (Section 6) but a somewhat better match to MDT pressures is obtained using 0.75 psi/m. Since the oil leg is only 7 to 8m thick, the gradient uncertainty results in free water level uncertainty of only about 1m.

The gradient lines on Figure 2 are within 1.2 psi of all the interpreted formation pressures, which is reasonable given gauge uncertainty close to 1 psi and the possibility that at some points the MDT did not build up quite to formation pressure.

The free water level, obtained from the intersection of oil and water lines, is interpreted at 2010 to 2011mss.

The gas oil contact is probably within half a metre of 2003mss. The GOC cannot be shallower than 2002.7mss unless there was a problem with the gas sample there (unlikely). The GOC cannot be much deeper than 2003mss without making the oil gradient more than 0.75 psi/m (unduly high compared to Section 6 estimates) and at the same time failing to honour the MDT pressures as closely as the interpreted gradient lines.

4. Fluid Sampling and Analysis

Two fluid samples were taken in the 2002 Sand, both at 2002.7mss (2015.2 mKB) with the MDT tool. The fluid from a 1 gallon sample chamber was analysed by Petrolab in Adelaide (final report dated 24 September)

The composition is given in Table 2.

PVT analysis of the sample at 226°F (reservoir temperature) indicated gas with a dewpoint of 3827 psig, significantly above the reservoir pressure of 2897 psig (2911.63 psia from MDT). Basic physics suggests that a gas reservoir cannot have initial pressure below dewpoint, so to have dewpoint above reservoir pressure is anomalous. However my discussion with Petrolab's Mr Jan Bon on 6 October on this issue provided the following sound explanation:

- The small amount of liquid dropping out in the PVT cell as the pressure falls from 3827 to 2897 psig (Figure 3) is probably due to sample contamination.
- The further information that the reservoir pressure is 2897 psig virtually proves that conclusion. Jan said he had not known previously that the reservoir pressure was 2897 psig.

- Such sample contamination is not uncommon. Jan said he had done an analysis earlier this year of a gas sample which had an anomalously high dewpoint and was subsequently proven to have liquid contamination.

- The dewpoint pressure is very likely to be 2897 psig, equal to the reservoir pressure.

Equation of state calculations in Section 5 show that only 0.89% of heavy hydrocarbon contamination (eg from grease) could raise the dewpoint from 2897 to 3827 psig. Heavy hydrocarbon contamination could also have come from the oil leg since the sampling depth is within a metre of the interpreted GOC; there could be movable oil in a transition zone.

Other results from the Petrolab analysis need to be interpolated to the 2897 psig reservoir pressure. Fortunately in both their Constant Mass and Constant Volume Differential Depletion studies Petrolab recorded parameters at pressures within 100 to 160 psi of 2897 psig:

Bg: Petrolab Bg at 3827 psig = 0.004550 rcf/scf
Constant Mass Study V/Vsat at 3083 psig = 1.1845
Constant Mass Study V/Vsat at 2797 psig = 1.2881
Interpolated V/Vsat at 2897 psig = 1.2518
Bg at 2897 psig = 0.0045 * 1.2518 = 0.0056 rcf/scf = 1/178

Density: In situ reservoir gas density = 0.2514 g/cc measured by Petrolab at 3827 psig divided by 1.2518 V/Vsat = 0.201 g/cc at 2897 psig.

Condensate: The stock tank condensate gravity is probably close to 54.3° API as measured by Petrolab, since the sample was only slightly contaminated. The condensate content is complicated by the retrograde behaviour. For rigorous reserves and rate calculations the Petrolab results need to be considered in detail. For general reserves calculations a condensate-gas ratio of 60 stb per MMscf may be assumed; this is just below Petrolab's measured ratio at 3050 psig:

Ratio = 51.52 stb remaining in vapour divided by 0.8508 MMscf remaining vapour phase at 3050 psig
= 60.6 stb/MMscf
(in CVD Study, corrected to starting basis of 1 MMscf at 3827 psig).
(At 3827 psig Petrolab obtained 64.44 stb/MMscf).

5. Equation of State Calculations for Fluid Properties

PE Toolbox Equation of State Calculations

Using the Table 2 reservoir fluid composition with the C12+ fraction represented by n-C15, and a temperature of 380.1K (225°F), the software calculates:

- Dewpoint pressure = 198.08 atm = 2911.8 psia, matching the 2911.63 psia MDT pressure at 2002.7mss.

- Vapour density = 0.205 g/cc, matching the laboratory analysis density of 0.201 g/cc (Section 4).

- Liquid density = 0.406 g/cc.

The software was also used to simulate the effect of contaminating the sample. Adding 0.89% of n-C16 component raised the calculated dewpoint pressure to 261.4 atm = 3843 psia, demonstrating that only minor contamination would be required to raise the dewpoint to the 3827 psig pressure measured by Petrolab.

Edinburgh Petroleum Services "FLOSYSTEM" Equation of State Calculations

FLOSYSTEM calculates 2912 psia bubblepoint pressure, 2.76 rb/stb formation volume factor and 0.428g/cc in situ density for a volatile oil with the following properties:

- 226°F and 2912 psia
- 55°API
- Solution GOR = 2424.691 scf/stb and gas specific gravity = 0.8.

This is one possible set of properties for oil in equilibrium with the 2002.7mss gas at the gas dewpoint and oil bubblepoint pressure of 2912 psia. These properties are reasonable compared to typical volatile oil properties in OGCI's "Advanced Reservoir Engineering Course" notes (1985): API Gravity 35 to 55 degrees, Bo 1.5 to 3.5 rb/stb and solution GOR = 500 to 6000 scf/stb.

FLOSYSTEM can calculate the same bubblepoint for a denser oil. For instance the results are 2912 psia bubblepoint, 2.40 rb/stb Bo and 0.468 g/cc density for:
- 226°F and 2912 psia
- 51.362° API
- Solution GOR = 2000 scf/stb and gas specific gravity = 0.8

FLOSYSTEM calculates dewpoint pressure = 2871 psia, Bg = 0.0054 rcf/scf and 0.25 g/cc in situ density for gas with the following properties:

- 226°F and 2912 psia
- 0.874 gas gravity
- Condensate gravity = 54.3° API and content = 60 stb per MMscf.

Given the approximate nature of these calculations, using fluid densities rather than the more accurate PE Toolbox calculations that use the composition to C12+, the FLOSYSTEM calculations agree reasonably with PE Toolbox calculations and the Petrolab measurements. For the FLOSYSTEM correlation to calculate 2912 psia dewpoint pressure the condensate content only needs to be increased from 60 to 68.6 stb/MMscf.

6. In Situ Fluid Densities

For gas assume 0.21 g/cc (equivalent to 0.299 psi/m gradient) based on 0.201 backed-out from Petrolab measurements, 0.205 from PE Toolbox calculations and 0.25 from FLOSYSTEM calculations.

Calculations for the likely oil leg suggest approximately 0.406 g/cc (equivalent to 0.58 psi/m gradient) from PE Toolbox or 0.428 g/cc (equivalent to 0.61 psi/m) from FLOSYSTEM. FLOSYSTEM calculations show that a much denser oil, perhaps 0.468 g/cc (equivalent to 0.67 psi/m) can have the same bubblepoint.

For water assume:

- Bw = (1 + 0.048) * (1 – 0.005) = 1.043 rb/stb where 0.048 is the temperature correction factor and 0.005 the pressure correction factor obtained from OGCI course notes.
- Density at standard conditions assumed to be around 1.03 g/cc.
- Therefore in situ density = about 1.03/1.043 = 0.99 g/cc (equivalent to 1.41 psi/m gradient).

Fekete's September 1998 MDT Report states that the water gradient from MDT points from 1900 to 2154 mKB was 1.37 psi/m.

7. Log and Mudlog Information on In Situ Fluid Type

There is good agreement between the predicted free-water level (2011mss = 2023.5mRT) from interpretation of the MDT pressure data and its position from interpretation of the wireline logs (right-hand side of figure 4) . On wireline logs a marked transition zone is indicated by the deep resistivity device and by the computed water saturation above the free-water level. Approximately 0.5 metres of water saturated sandstone falls below the free-water level prior to a shale break. Wireline logs confirm that the first sandstone (2028 – 2030mRT) below the shale break is water saturated.

Evidence for the gas-oil contact on the log analysis results by Schlumberger is provided by a marked increase in residual saturation (invaded zone hydrocarbon saturation labelled 'X Zone Gas' on its ELAN plot, figure 4) below the calculated gas-oil contact (2003mss = 2015.5mRT). Such increased residual saturation is indicative of the possible reduced mobility of a liquid phase in the invaded zone.

Other evidence supporting the presence of an oil leg is provided by an analysis of gas ratios from the mud log gas chromatograph using the techniques of Haworth et al, 1985 (left-hand side of figure 4). These data show the expected separation of the wetness (Wh) and balance (Bh) ratios in the gas column. Unfortunately gas chromatograph data at the gas-oil contact is not available due to coring operations. However below the cored interval there is convergence and cross-over of the wetness and balance ratios and elevation of the character (Ch) ratio which together are indicative of gas associated with oil, again agreeing with the interpretation of MDT and fluid analysis data.

References

Haworth, J.H., Sellens, M., and Whittaker, A. (1985) Interpretation of hydrocarbon shows using light (C1-C5) hydrocarbon gases from mud-log data. AAPG Bulletin V.69, No. 8, P. 1305-1310.

TABLE 1 - SUMMARY RESULTS OF WHITE IBIS 1 MDTs RUN ON 27/6/98

(Page 1 of a 2-page table)

DEPTH		HYDROSTATIC PRESSURE		FORMATION PRESSURE		HYDROSTATIC PRESSURE		DRAW DOWN	MOBILITY md /cp	TEMP °C
		BEFORE TEST				AFTER TEST				
MEASURED DEPTH, assumed = TVD		STRAIN	HP	STRAIN	HP	STRAIN	HP			
		PSIG	PSIA	PSIG	PSIA	PSIG	PSIA	PSI		
1976.0		3354.4	3367.5	-	-	3354.9	3367.39	14	Tight	101.9
1975.5		3353.1	3366.63	2842.7	2854.87	3353.7	3366.22	853	3.1	102.3
1979.8		3361.5	3373.54	-	-	3361.4	3372.51	20	Tight	102.9
1980.7		3362.6	3374.37	-	-	3362.5	3373.6	32	Tight	103.4
1980.3		3361.9	3373.48	2846.4	2857.56	3361.4	3372.73	2851.0	946.7	103.6
1981.5		3363.8	3375.12	-	-	3363.8	3374.62	34	Tight	103.9
1984.5		3368.2	3379.71	28532.0	2863.68	3368.2	3378.97	2820.5	121.8	105.1
2002.0		3396.7	3407.71	2897.0	2907.72	3396.5	3407.37	2757.2	36	105.1
2004.5		3400.6	3411.35	2897.7	2908.39	3400.5	3411.1	2739.6	36.9	105.2
2006.4		3403.6	3414.55	2897.3	2908.08	3403.6	3413.9	2805.1	60.1	105.3
2008.5		3406.7	3417.48	2897.4	2908.2	3406.5	3417.43	2544.1	15.2	105.4
2010.4		3409.6	3420.32	2898.4	2909.17	3409.4	3420.08	2791.1	50.9	105.5
2013.8		3415.1	3426.03	2900.8	2911.76	3414.7	3425.7	2714.2	30.4	105.6
2015.2		3416.8	3427.80	2900.7	2911.63	3416.7	3427.83	2839.0	77.2	106.0
2018.0		3421.5	3432.48	2903.4	2914.49	3421.4	3431.83	2562.3	18.2	106.5
2019.5		3423.7	3434.80	2903.4	2914.52	3423.4	3434.5	2841.8	71.8	106.6
2005.8		3401.3	3412.14	2896.6	2907.33	3400.6	3411.95	2861.4	140.3	106.1
2021.3		3426.0	3437.27	2904.8	2916.16	3425.8	3437.25	2888.7	253.0	106.1
2023.5		3429.2	344.83	2905.5	2917.08	3429.3	344.76	2724.0	34.9	106.4
2028.2		3436.7	3448.46	2912.1	2923.77	3436.6	3448.16	2819.1	63.1	106.8
2035.5		3448.4	3460.38	2923.1	2934.85	3448.2	3460.14	2781.8	41.7	108.1
2044.5		3462.8	3474.77	2942.5	2954.25	3463.1	3474.68	28-7.5	45.3	107.8
2046.0		3465.4	3477.33	2943.9	2955.63	3465.1	3476.85	2689.1	25.2	108.1
2048.0		3468.5	3480.25	2943.5	2955.18	3468.2	3480.07	2936.61	339.8	108.4
2050.1		3471.6	3483.92	2943.7	2955.38	3471.1	3483.35	2849.0	48.0	108.4
2052.2		3475.1	3486.82	2944.9	2956.68	3479.8	3486.55	2877.7	87.9	108.5
2057.0		3482.5	3494.43	2951.7	2963.51	3482.3	3494.12	2677.4	23.0	108.7
2059.0		3485.6	3497.70	2954.8	2966.52	3485.4	3497.29	2087.7	5.3	109.1
2068.5		3501.0	3513.00	2967.1	2978.89	3501.0	3512.65	2810.5	38.9	109.2
2074.0		3509.5	3521.58	2974.6	2986.38	3509.8	3521.73	2449.6	11.5	109.5

2078.5		3517.0	3528.87	2980.8	2992.69	3517.1	3529.0	2941.8	134.9	109.7
2079.4		3518.3	3530.51	2981.7	2993.64	3518.3	3530.34	2971.1	266.2	109.8
2090.0		3535.8	3547.91	2998.4	3008.42	3535.9	3546.9	2709.3	28.0	110.1
2099.2		3563.19	3551.2	3014.7	3026.60	3551.4	3563.44	1783.8	1.1	110.4
2106.0		3561.8	3523.69	3023.0	3035.02	3562.0	3574.15		9.7	110.8
2111.0		3570.8	3583.07	3029.5	3041.4	3571.0	3583.07	1921.1	3.8	111.2
2118.6		3583.0	3595.0	-	-	3583.3	3597.31	1514.9	Tight	111.1
2129.2		3601.3	3613.12	3069.2	3081.23	3600.7	3612.71	1749.5	2.0	111.3
2132.7		3607.0	3618.98	3065.8	3077.79	3606.6	3618.65	2829.7	34.4	111.5
2133.6		3609.2	3620.44	3071.4	3083.49	3608.6	3620.65	1416.9	1.4	111.7
2136.4		3613.4	3625.58	3066.5	3078.59	3613.6	3625.54	2653.4	13.9	111.8
2137.3		3614.8	3626.88	3066.2	3078.35	3614.2	3626.18	2458.1	10.0	111.9
2138.5		3616.5	3629.49	3066.5	3078.59	3616.7	3628.75	2610.4	12.9	112.0
2141.1		3621.2	3633.34	3069.2	3081.33	3621.1	3633.44	1577.85	2.8	111.9
2146.3		3630.1	3642.42	3075.6	3087.80	3629.5	3642.3	2784.94	21.3	112.4
2153.5		3642.1	3653.62	3082.7	3094.89	3641.3	3654.6	3030.18	76.5	112.3
2129.6		3602.3	3614.69	-	-	3601.9	3614.0		Tight	
1901.0		3219.1	3232.09	2791.9	2754.97	3218.4	3231.73	2704.6	124.7	103.6
1919.0		3248.7	3261.97	2762.2	2775.09	3248.8	3261.71	2762.2	558.7	104.1
1954.0		3306.5	3320.06	2809.2	2822.14	3306.3	3319.79	2798.0	229.4	104.9
2006.0		3400.3	3410.80	2895.8	2907.40					
2006.0		3397.7	NA	2895.5	2907.15					
2015.2		3411.0	NA	2899.1	NA	3411.07	NA			
2048.5										

570166

Table 2

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

COMPOSITIONAL ANALYSIS OF BOTTOM HOLE SAMPLE
L-013 Depth 2015.2 m From MRSC-BB-139

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	0.13	8.16	8.00
Nitrogen	N2	0.00	1.97	1.93
Methane	C1	0.44	72.33	70.92
Ethane	C2	0.23	5.96	5.85
Propane	C3	0.51	3.61	3.55
Iso-Butane	iC4	0.59	1.63	1.61
N-Butane	nC4	0.73	1.38	1.37
Iso-Pentane	iC5	1.40	0.97	0.98
N-Pentane	nC5	1.29	0.69	0.70
Hexanes	C6	5.78	1.32	1.41
Heptanes	C7	20.63	1.29	1.67
Octanes	C8	17.63	0.43	0.77
Nonanes	C9	15.81	0.18	0.49
Decanes	C10	12.29	0.07	0.31
Undecanes	C11	7.42	0.01	0.16
Dodecanes Plus	C12+	15.13	0.00	0.28
TOTAL		100.00	100.00	100.00
Ratios				
Molar Ratio	:	0.0196	0.9804	1.0000
Mass Ratio	:	0.0881	0.9119	1.0000
Liquid Ratio (bbl/bbl)	:	1.0000 @ SC	–	–
Gas Liquid Ratio	:	1.0000 bbl @ SC	41551 SCF	–
Stream Properties				
Molecular Weight	:	122.0	25.21	27.11
Density obs. (gm/cc)	:	0.7610 @ 60 °F	–	–
Gravity (AIR = 1.000)	:	54.3 °API @ 60 °F	0.874	–
GHV (BTU/scf)	:	–	1272	–
Hexanes Plus Properties				
Mol %	:	94.69	3.30	5.09
Molecular Weight	:	125.5	95.0	106.1
Density (gm/cc @ 60 °F)	:	0.7672	0.6823	0.7164
Gravity (°API @ 60 °F)	:	52.8	75.7	65.8
Heptanes Plus Properties				
Mol %	:	88.91	1.98	3.68
Molecular Weight	:	128.2	102.3	114.5
Density (gm/cc @ 60 °F)	:	0.7711	0.6921	0.7318
Gravity (°API @ 60 °F)	:	51.8	72.8	61.7
Decanes Plus Properties				
Mol %	:	34.83	0.08	0.75
Molecular Weight	:	161.4	84.0	144.7
Density (gm/cc @ 60 °F)	:	0.8023	0.6661	0.8023
Gravity (°API @ 60 °F)	:	44.7	80.7	44.7
Undecanes Plus Properties				
Mol %	:	22.55	0.01	0.44
Molecular Weight	:	176.3	147.0	172.5
Density (gm/cc @ 60 °F)	:	0.8128	0.7400	0.8128
Gravity (°API @ 60 °F)	:	42.4	59.5	42.4
Dodecanes Plus Properties				
Mol %	:	15.13	0.00	0.28
Molecular Weight	:	190.7	–	190.7
Density (gm/cc @ 60 °F)	:	0.8222	–	0.8222
Gravity (°API @ 60 °F)	:	40.4	–	40.4

* (P)ressure : 3827 psig * (T)emperature : 226 °F

570167

Figure 1

5 cm

Schlumberger

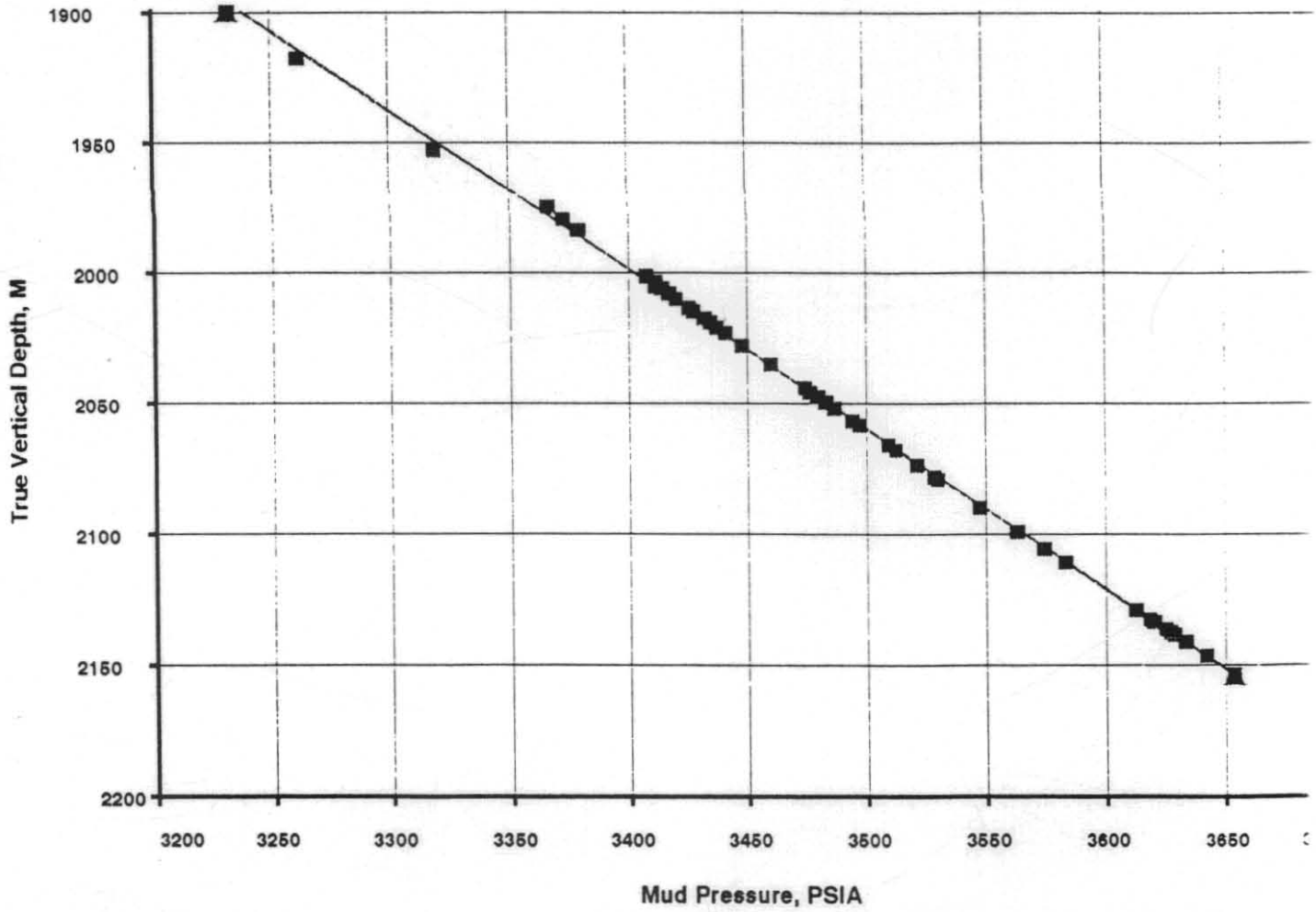
Mud Pressure vs Depth

MAXIS 500 Field Log

27-JUN-1998

Premier Oil Australasia
Wildcat
White Ibis #1

Mud Density: 1.65 PSIM = 1.16 G/C3



MRPS_1- Gauge Name: BQP1

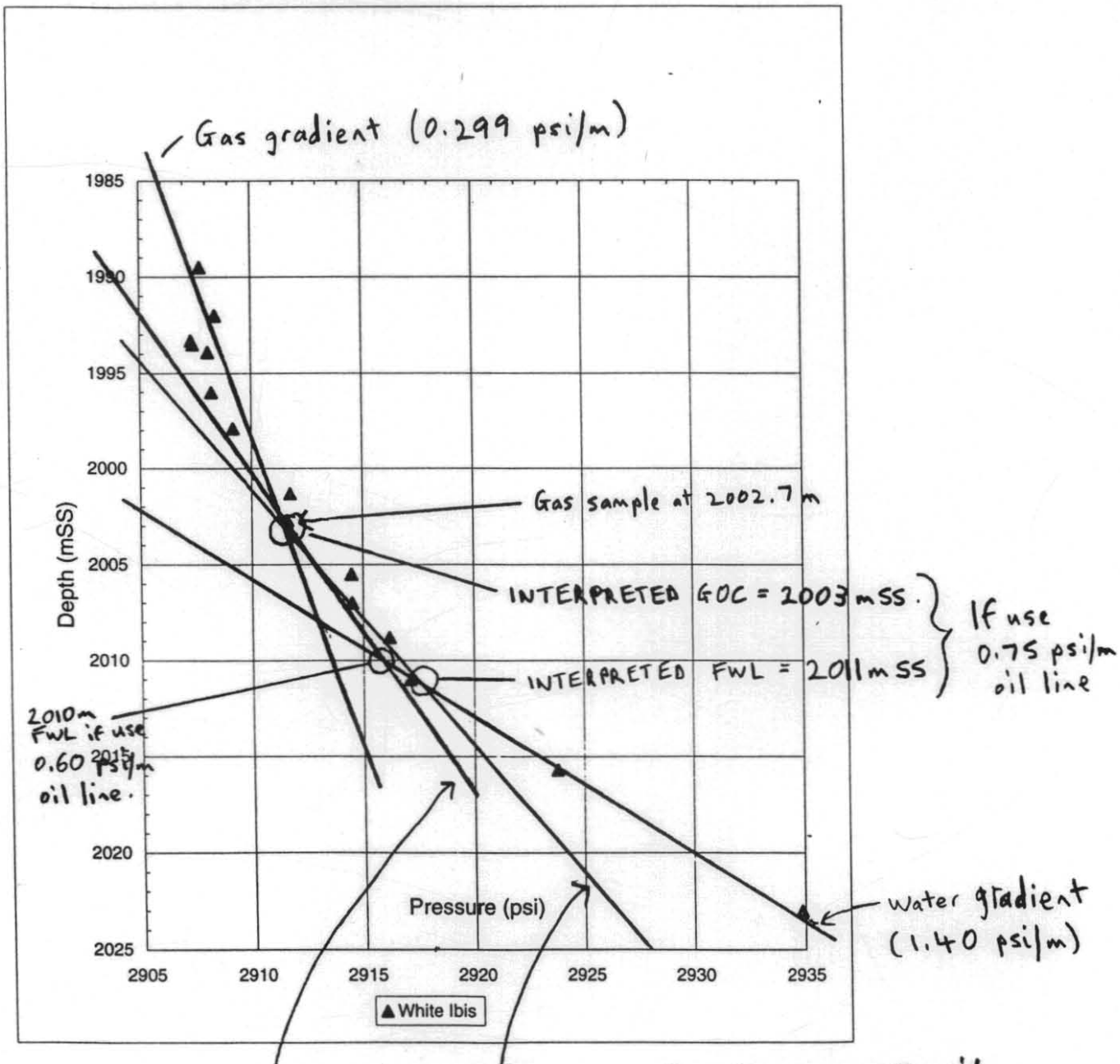
570168

Figure 2 - MDT Gradient Analysis In the 2002 Sand

KB= 12.50 m

Depth (m KB)	Depth (m SS)	Formation Pressure (psia)
2002.0	1989.5	2907.72
2004.5	1992.0	2908.39
2005.8	1993.3	2907.33
2006.0	1993.5	2907.40
2006.4	1993.9	2908.08
2008.5	1996.0	2908.22
2010.4	1997.9	2909.17
2013.8	2001.3	2911.76
2015.2	2002.7	2911.63
2018.0	2005.5	2914.49
2019.5	2007.0	2914.52
2021.3	2008.8	2916.16
2023.5	2011.0	2917.08
2028.2	2015.7	2923.77
2035.5	2023.0	2934.85

5 cm



570169

Figure 3

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

File : P 98045

RETROGRADE CONDENSATION

Equation of best fit

Constant Volume

RLD = +1.16E+00 +2.59E-03 * P -1.18E-06 * P^2 -4.93E-11 * P^3 +4.19E-14 * P^4

Constant Mass

RLD = +8.58E-01 +5.59E-03 * P -3.07E-06 * P^2 +2.86E-10 * P^3 +3.21E-14 * P^4

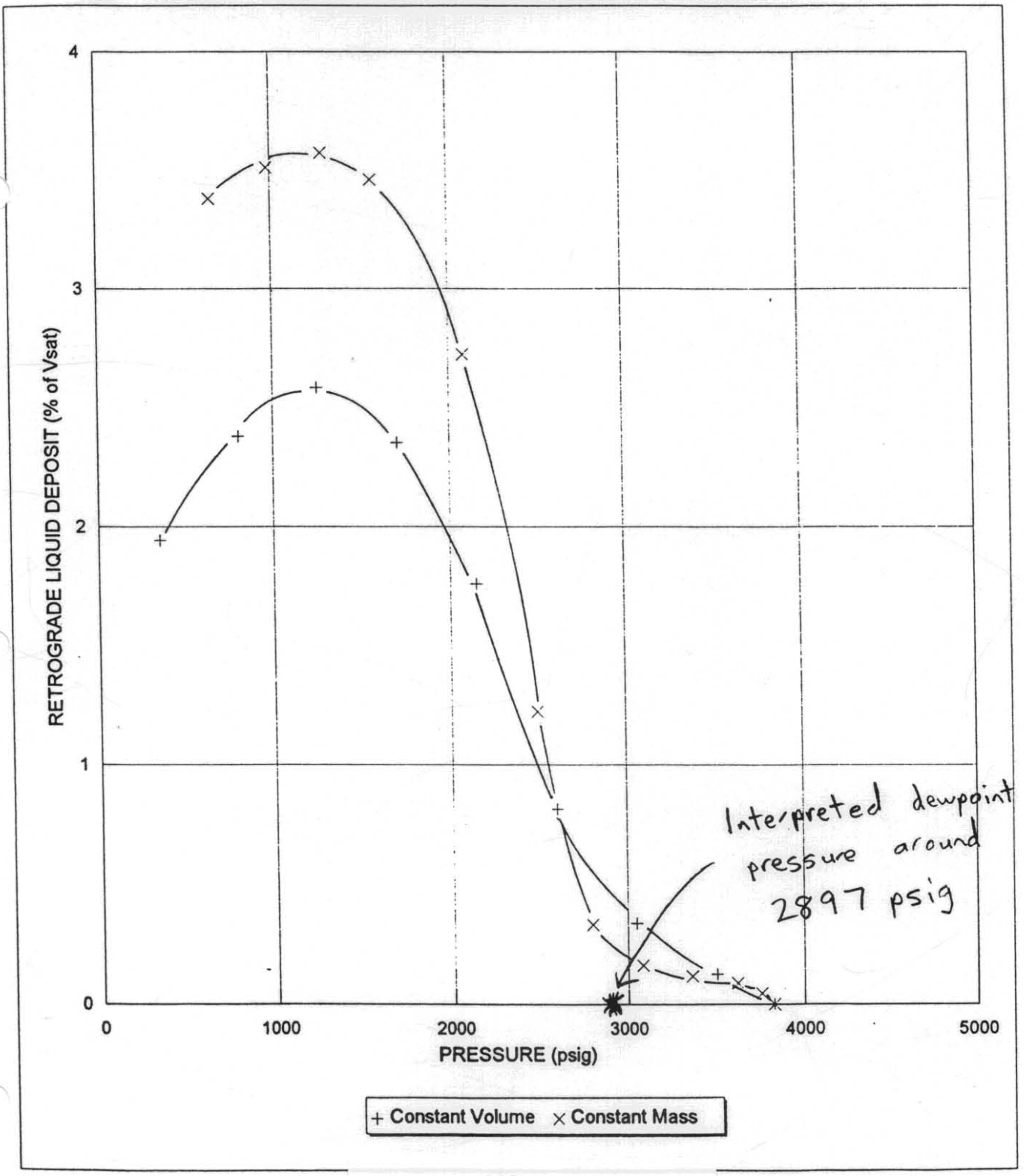
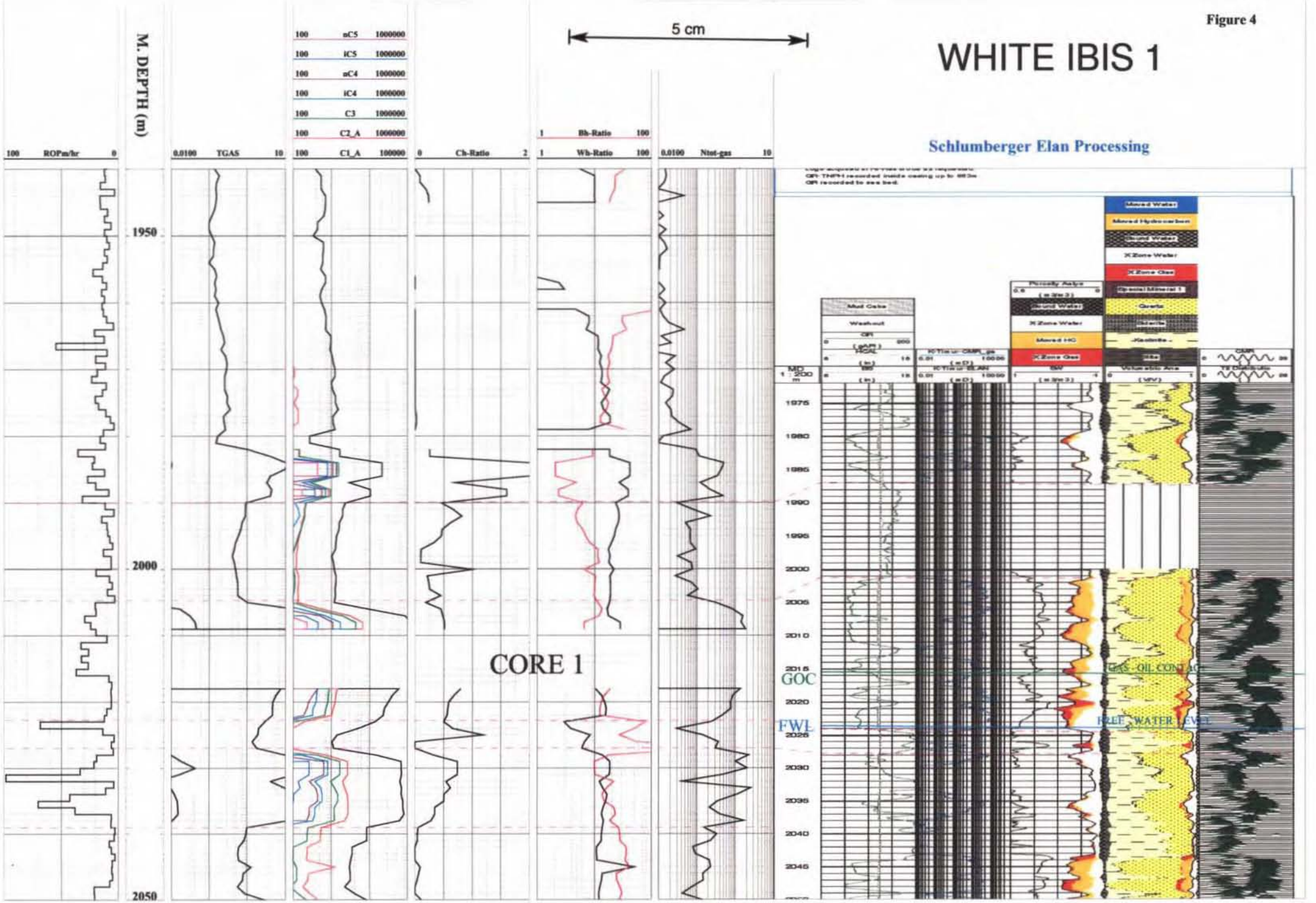


Figure 4

WHITE IBIS 1



5701.0

APPENDIX 1

September 1998 Interpretation of the 2002 Sand Fluids by Premier/Fekete

The interpretation shown in the graph on the next page (Figure A1.1) is problematical because the gradient of 0.519 psi/m is 1.74 times the likely gas gradient, far too large a discrepancy to be explained by measurement error.

Fekete's September 1998 report referred to the possibility of an oil leg as identified in Boral Energy's first look at the data, raised at the September TCM. Fekete suggested two reasons, both technically erroneous, why it is very unlikely that there is an oil leg:

1. "The gradient for 60 API oil is approximately 1.05 psi/m".
   (Note: This is true but only for dead oil with no solution gas). "The assumed oil gradient (in Boral's graph presented at the TCM) is 0.62 psi/m. This is too low to be an oil gradient".

   These statements ignore the effect of dissolved gas in lowering oil density. Calculations below clearly show that oil gradient can be much less than 1 psi/m for volatile oils.

2. "For an oil leg to exist, the pressure has to go above dewpoint in the reservoir. The fluid sample from 2002.7mss was sampled in the gas phase at 2912 psia. The dew point as measured by Petrolab is 3827 psi, so the fluid will still be in the gas phase at the FWL of 2012mss".

   These statements are incorrect because initial reservoir pressure is either above dewpoint (in which case there is no oil leg in equilibrium) or at dewpoint (in which case an oil leg is likely). As discussed in Section 4 it would be anomalous for the dewpoint pressure to be above the initial pressure of a gas reservoir.

Calculation of Typical Volatile Oil Gradient

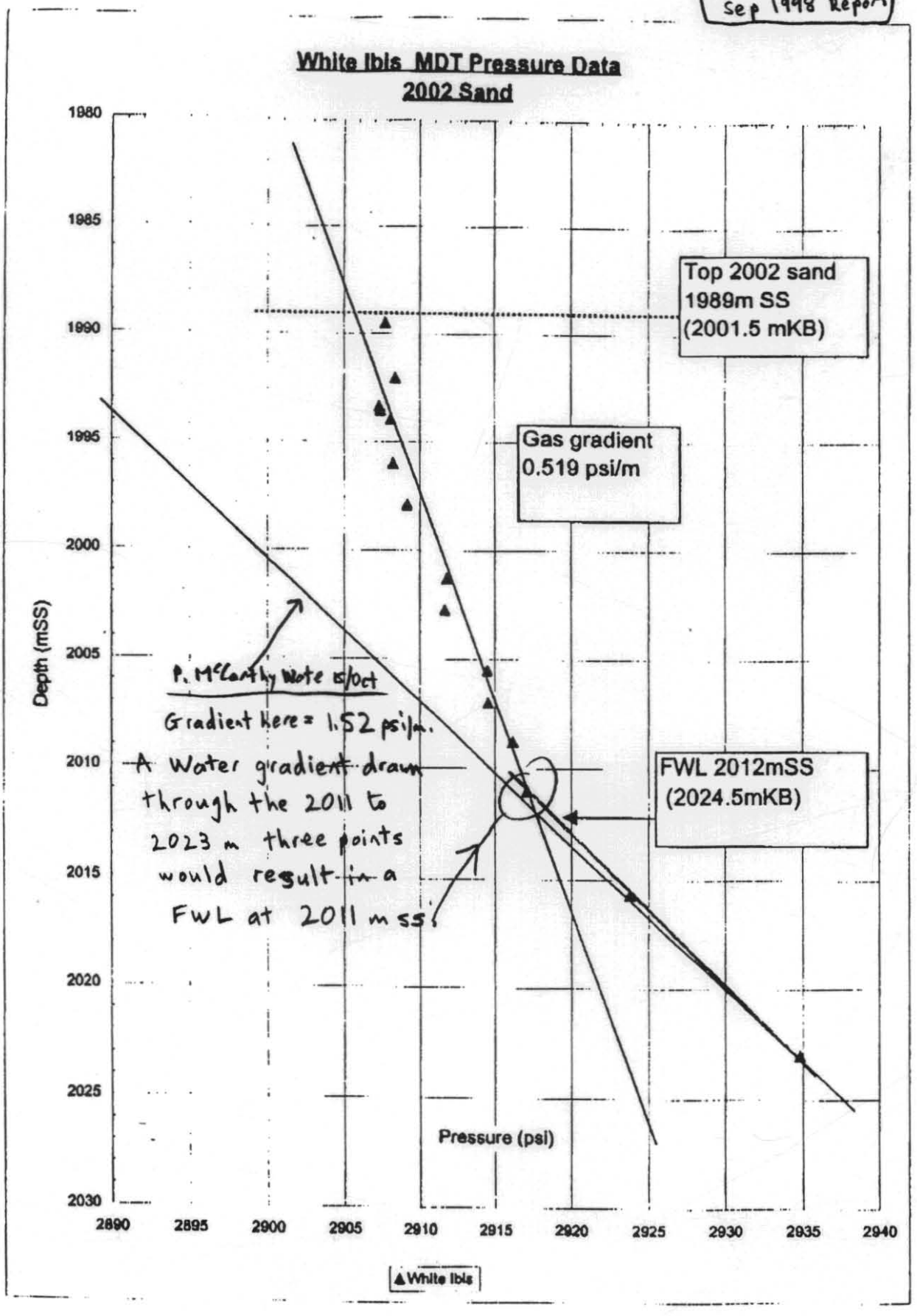
OGCI "Applied Reservoir Engineering" 1986 course notes suggest a "typical" volatile oil has Bo = 2.5 rb/stb, solution GOR = 3000 scf/stb and 45°API gravity (0.802 specific gravity). In situ density can be calculated as follows assuming gas specific gravity of 0.75:

- Mass associated with each stb of oil
  = 0.802 * 350 lb/bbl + 0.75 * 3000 cf/bbl * (0.07633 lb/cf air density)
  = 280.70 + 171.74
  = 452.44 lb

- Reservoir volume associated with that mass = 2.5 bbls
- In situ density = 452.44/2.5 = 181.0 lb/bbl
- Equivalent gradient = 0.74 psi/m

570172 Appendix 1
Figure A1.1

FIGURE 3
from Fekete's
Sep 1998 Report

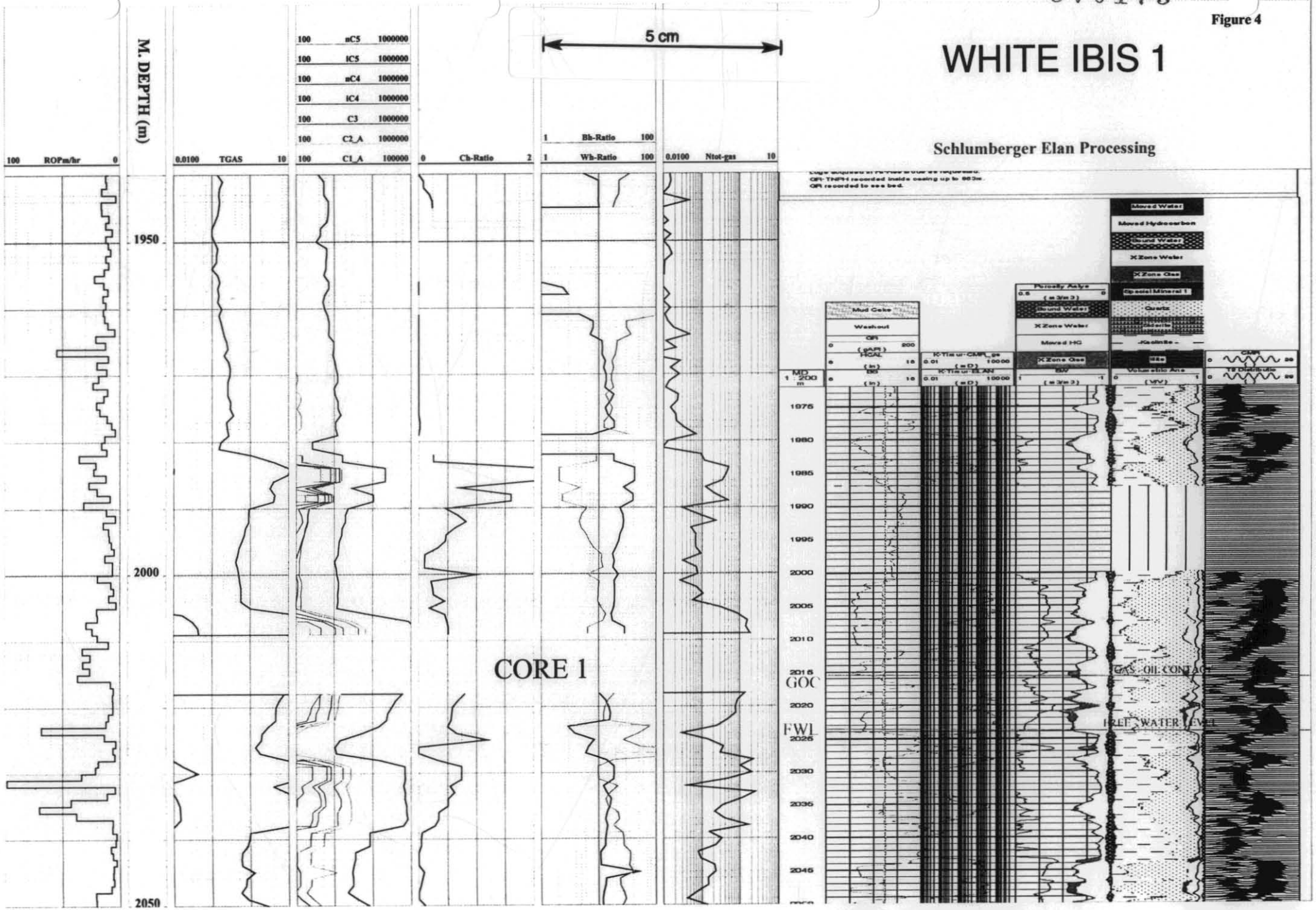


5 cm

570173

Figure 4

WHITE IBIS 1



570174

WHITE IBIS MDT RESULTS

Prepared For: Premier Oil
Prepared By: Fekete Australia Pty Ltd

September 1998

White Ibis MDT Results

Introduction

A MDT was conducted on White Ibis on June 27, 1998. The primary goals of the MDT program were:

a. Gain sufficient formation pressure data to differentiate between any distinct pressure zones.

b. Where water-bearing sands were encountered, collect sufficient formation data to define the water leg gradient and therefore any gas-water contacts.

c. Collect a sufficient quantity and quality of reservoir fluids from distinct reservoir zones to provide a complete reservoir fluid compositional picture throughout the reservoir.

d. Collect a water sample to determine water properties for petrophysical analysis.

The program successfully accomplished all the goals.

Pressure Pre-tests

Fifty-one pre-tests were completed, with only four of these tests being unsuccessful. The reason for these failures was that the source rock was too tight to observe a build up in a reasonable time.

From the remaining forty-seven pre-tests, three distinct pressure zones were identified. Some scatter was evident in the data due to supercharging. As such the water gradient may vary slightly between zones. There is also minor uncertainty in estimates of gradients and free water levels calculated below.

Following are the conclusions from the MDT pre-tests.

1. A valid water gradient was established from 1900 to 2154 m KB. The water gradient is estimated to 1.37psi/m (0.42 psi/ft). The most likely gradient is shown in Figures 1 and 2.

2. A hydrocarbon zone referred to as the 2002 sand is present at 1989 mSS (2001.5 mKB). The most likely gas gradient is estimated to be 0.519 psi/m (0.16 psi/ft) and the free water level is estimated to be at 2012 mSS. This is shown in Figure 3.

3. A hydrocarbon zone referred to as the 2044 sand is present at 2031.5 mSS (2044 mKB). The most likely gas gradient is estimated to be 0.318 psi/m (0.10 psi/ft) and the free water level is estimated to be at 2040.5 mSS. This is shown in Figure 4.

4. A hydrocarbon zone referred to as the 2128 sand is present at 2115.5 mSS (2128 mKB). The most likely gas gradient is estimated to be 0.269 psi/m (0.08 psi/ft) and the free water level is estimated to be at 2127.5 mSS. This is shown in Figure 5.

Sampling

Four reservoir fluid samples were obtained as follows:

- Two gas samples at 2002.7 mSS (2015.2 mKB),
- One gas sample at 2036 mSS (2048.5 mKB)
- A water sample at 2066.9 mSS (2079.4 mKB).

The first two samples were one gallon gas samples from 2015.2 mKB. The pumpout module was run for 35.1 minutes to ensure clean samples. The optical fluid analyser indicated that the sample was clean when the samples were taken. This has since been confirmed by the lab analysis.

The next sample was attempted at 2048.5 mKB. The seal failed and the tool was pulled out of the hole. The packer was flat and damaged so it was replaced and the tool re-run. A one-gallon sample was then taken at 2048.5 mKB. The pumpout module was run for just over one hour until the optical fluid analyser indicated that the sample was clean. This has since been confirmed by the lab analysis.

The final sample was a one-gallon water sample at 2079.4 mKB. The seal failed again and the tool was pulled out of the hole. There was minor damage to the rubber packer. It was replaced, and a water sample at 2079.4 mKB was taken. The pumpout module was run for 110.6 minutes until the optical fluid analyser indicated that the sample was clean. The sample was then taken.

Compositional analysis of the 2048.5 mKB and the 2015.2 mKB samples are given in Figures 6 and 7. The water sample obtained from 2079.4 mKB was analysed on the rig. The sample contained 2.94 cubic feet of gas and 7.5 liters of water. The measured chlorides were 23,000 ppm and the resistivity was 0.293 at 15 °C.

Oil Leg

There was some speculation that White Ibis might have an oil leg. This is illustrated in Figure 8.

It is very unlikely that there is an oil leg, because:

1. The 'assumed' oil gradient shown in Figure 8 is 0.62 psi/m. This is too low to be an oil gradient. The gradient for 60 API oil is approximately 1.05 psi/m. There are not very many oils on record with API gravities greater than 60.

2. For an oil leg to exist, the pressure has to go above dew point in the reservoir. The fluid sample from 2002.7 mSS was sampled in the gas phase at 2912 psia. The dew point as measured by Petrolab is 3827 psi, so the fluid will still be in the gas phase at the FWL of 2012 mSS.

Tom Fontaine
Manager Reservoir Engineering

570177

FIGURE 1

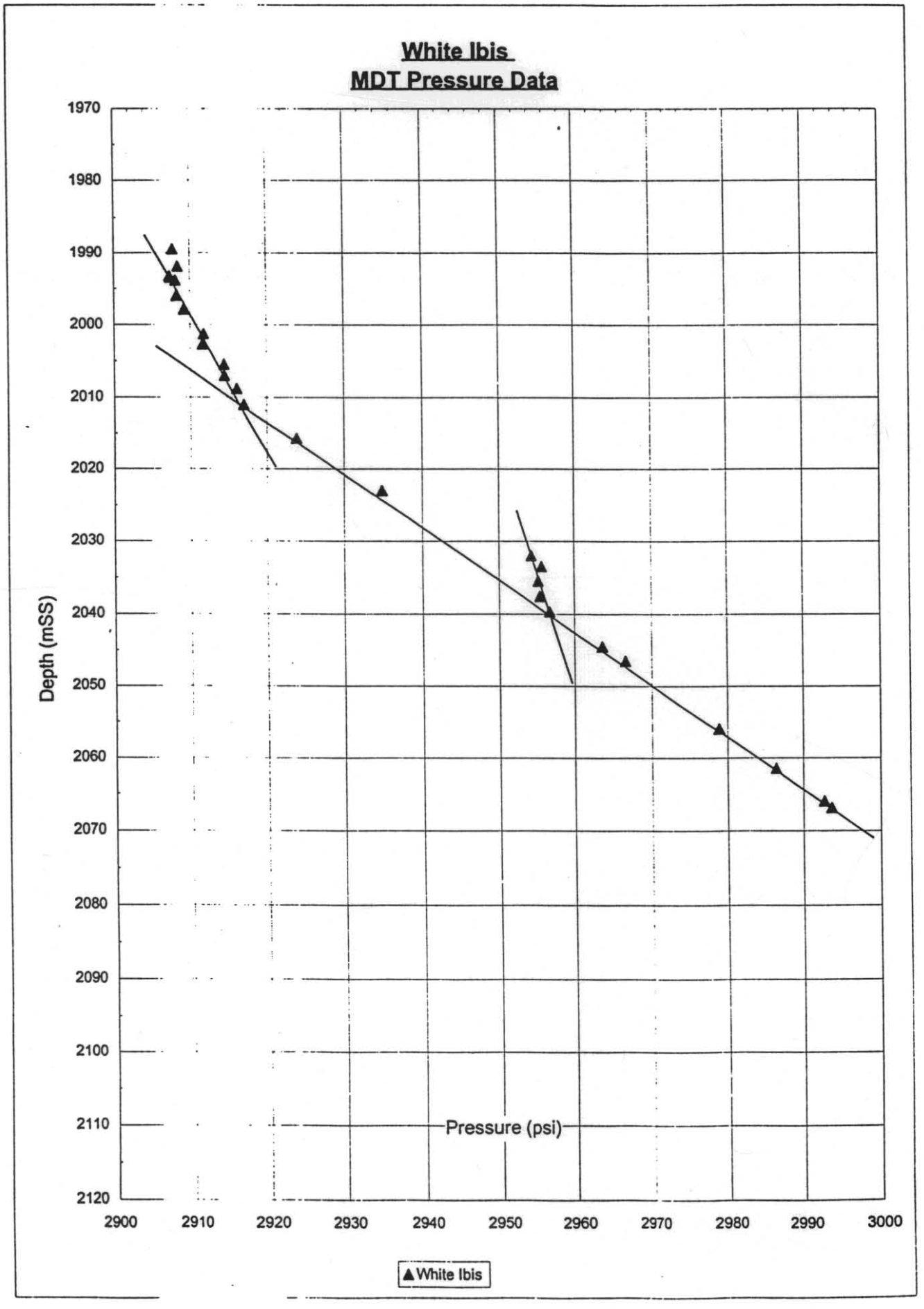
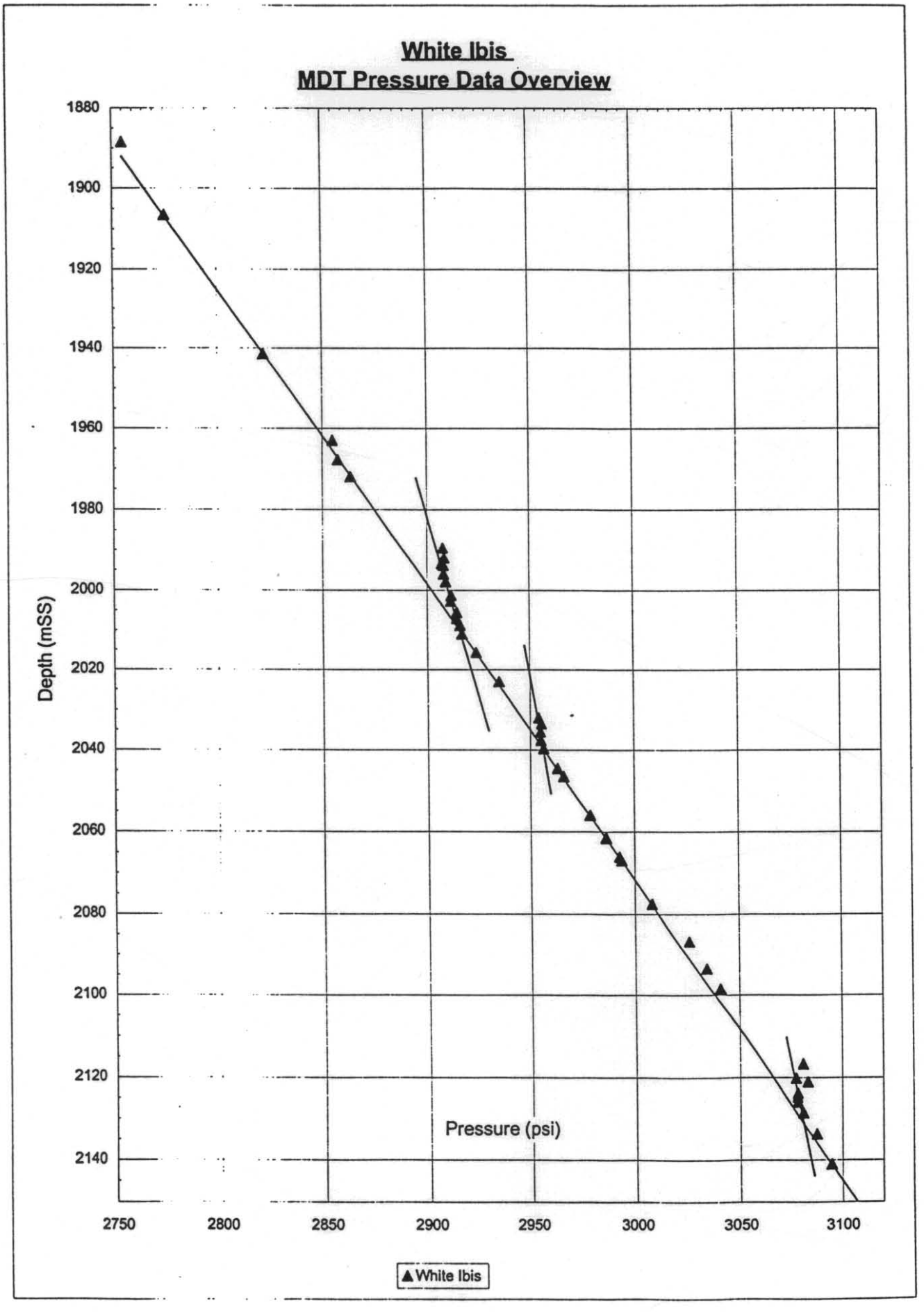
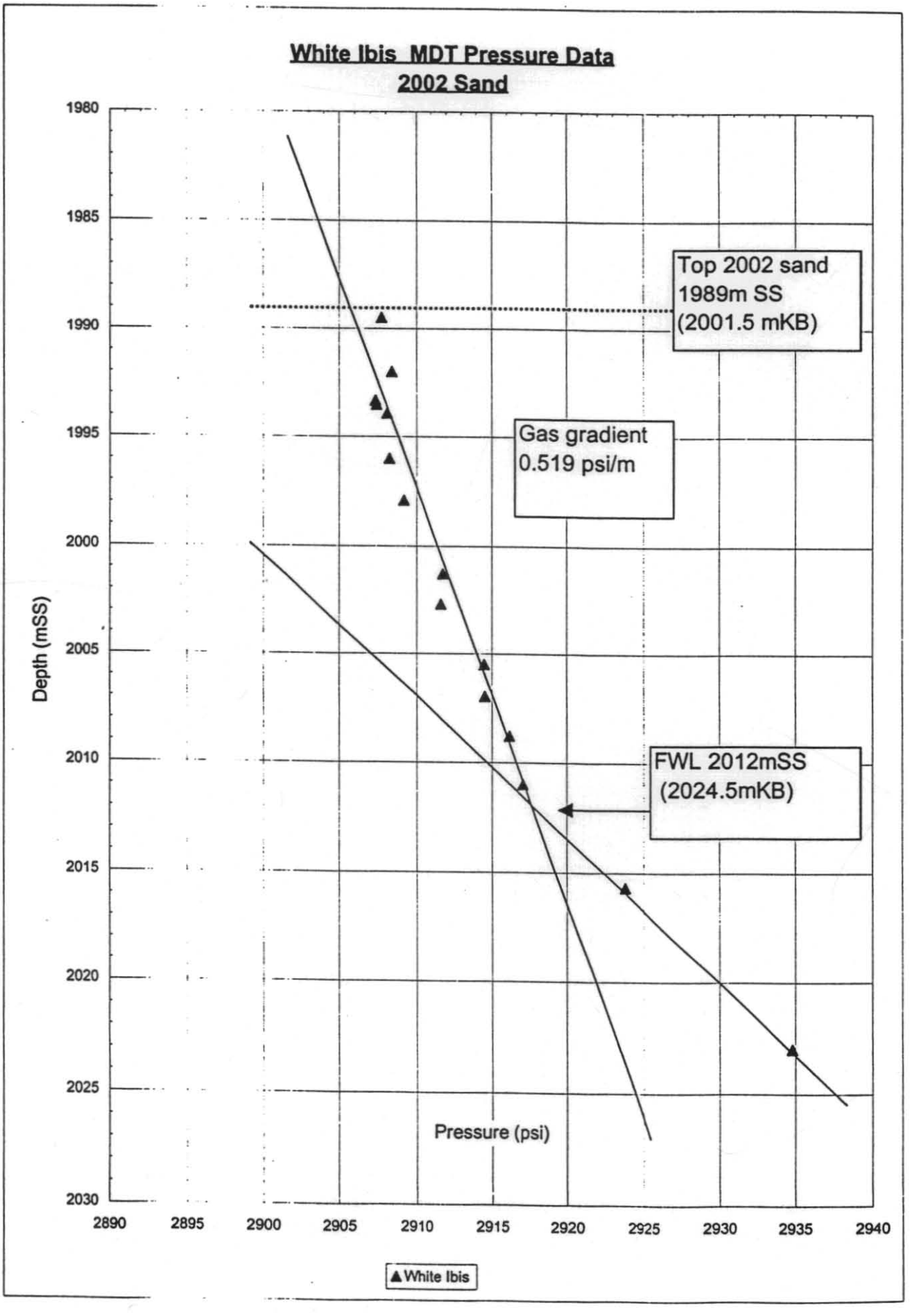


FIGURE 2


White Ibis
MDT Pressure Data Overview
Depth (mSS)
1880
1900
1920
1940
1960
1980
2000
2020
2040
2060
2080
2100
2120
2140
Pressure (psi)
2750
2800
2850
2900
2950
3000
3050
3100
White Ibis
5 cm

570179

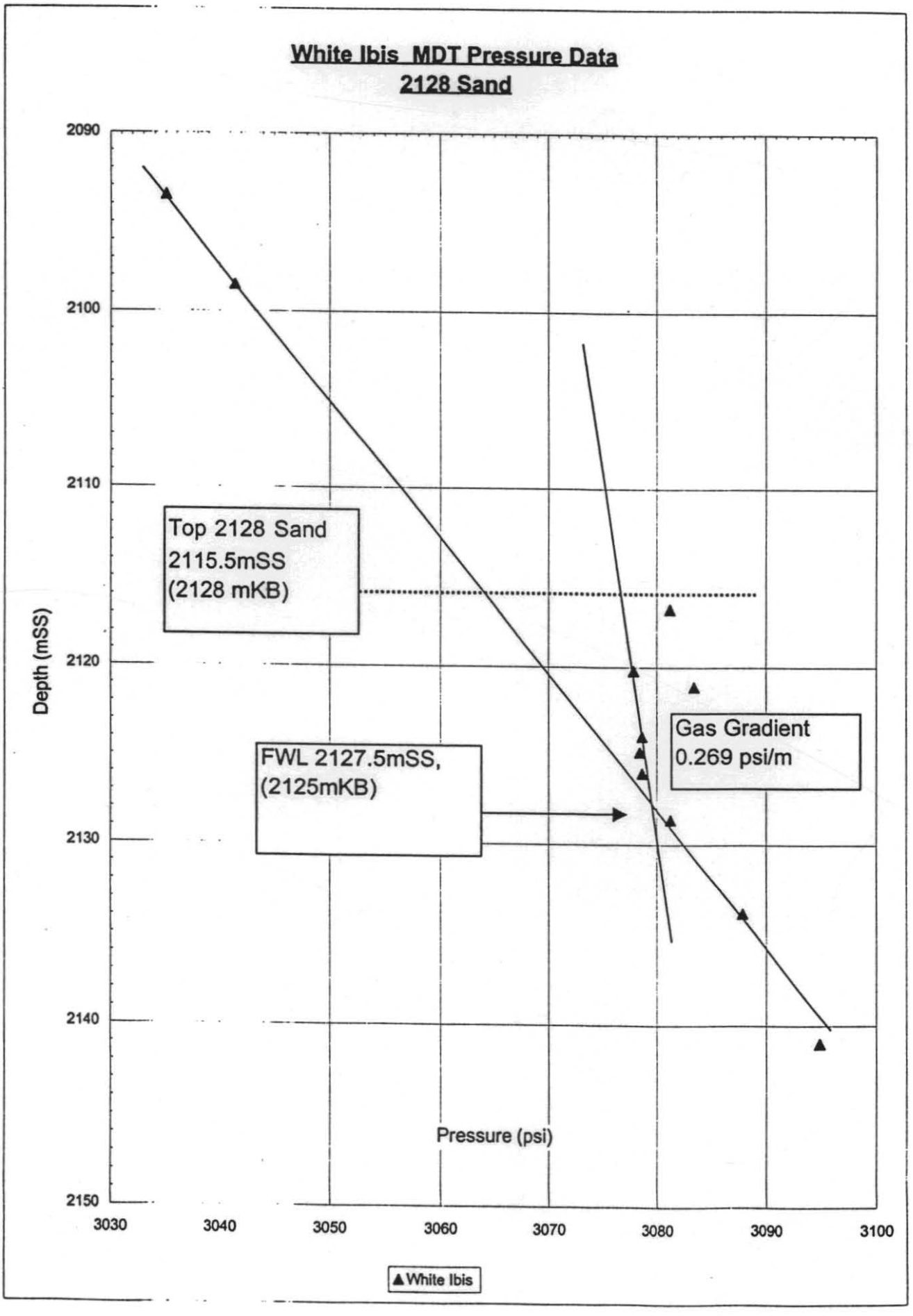
FIGURE 3



5 cm

570180

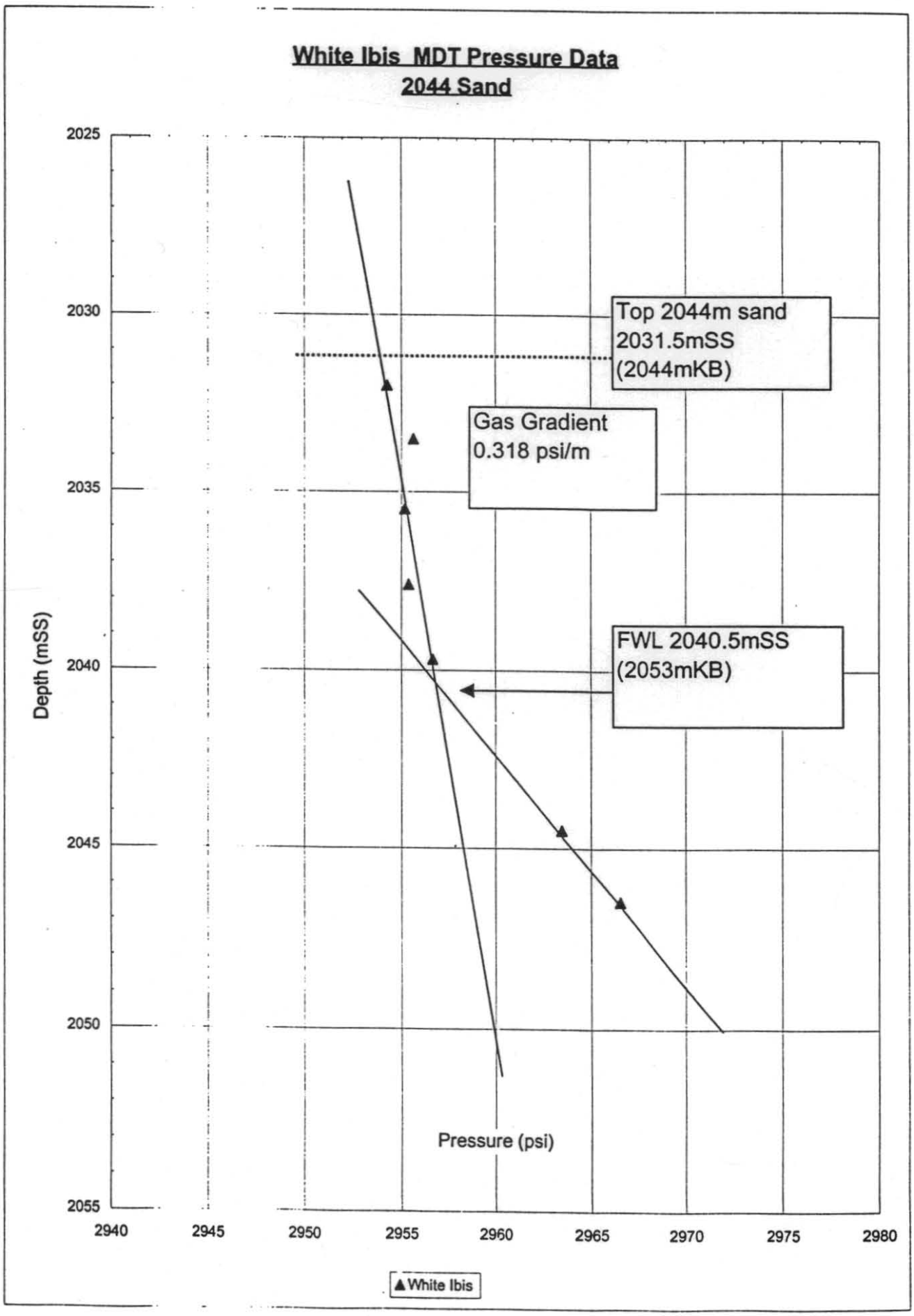
FIGURE 4



5 cm

570181

FIGURE 5



PETROLAB

Company : Premier Oil
Well : White Ibis #1

COMPOSITIONAL ANALYSIS OF BOTTOM HOLE SAMPLE
L-011 Depth 2048.5 m From MRSC-BB-120

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	0.13	8.09	8.09
Nitrogen	N2	0.00	1.91	1.91
Methane	C1	0.47	77.92	77.92
Ethane	C2	0.23	5.99	5.99
Propane	C3	0.33	2.36	2.36
Iso-Butane	iC4	0.28	0.76	0.76
N-Butane	nC4	0.43	0.81	0.81
Iso-Pentane	iC5	0.65	0.45	0.45
N-Pentane	nC5	0.52	0.28	0.28
Hexanes	C6	5.92	0.64	0.64
Heptanes	C7	21.13	0.52	0.52
Octanes	C8	18.06	0.17	0.17
Nonanes	C9	16.19	0.08	0.08
Decanes	C10	12.58	0.02	0.02
Undecanes	C11	7.60	0.00	0.00
Dodecanes Plus	C12+	15.49	0.00	0.00
TOTAL		100.00	100.00	100.00
Ratios				
Molar Ratio	:	0.0000	1.0000	1.0000
Mass Ratio	:	0.0001	0.9999	1.0000
Liquid Ratio (bbl/bbl)	:	1.0000 @ SC	–	–
Gas Liquid Ratio	:	1.0000 bbl @ SC	∞ SCF	–
Stream Properties				
Molecular Weight	:	123.3	22.22	22.2
Density obs. (gm/cc)	:	0.7610 @ 60 °F	–	–
Gravity (AIR = 1.000)	:	54.3 °API @ 60 °F	0.770	–
GHV (BTU/scf)	:	–	1113	–
Hexanes Plus Properties				
Mol %	:	96.97	1.43	1.43
Molecular Weight	:	125.5	93.9	94.0
Density (gm/cc @ 60 °F)	:	0.7646	0.6807	0.6808
Gravity (°API @ 60 °F)	:	53.4	76.2	76.1
Heptanes Plus Properties				
Mol %	:	91.04	0.79	0.79
Molecular Weight	:	128.2	101.9	101.9
Density (gm/cc @ 60 °F)	:	0.7684	0.6915	0.6917
Gravity (°API @ 60 °F)	:	52.5	72.9	72.9
Decanes Plus Properties				
Mol %	:	35.67	0.02	0.02
Molecular Weight	:	161.4	84.0	3.8
Density (gm/cc @ 60 °F)	:	0.7964	0.6661	0.7964
Gravity (°API @ 60 °F)	:	46.0	80.7	46.0
Undecanes Plus Properties				
Mol %	:	23.09	0.00	0.00
Molecular Weight	:	176.3	–	176.3
Density (gm/cc @ 60 °F)	:	0.8043	–	0.8043
Gravity (°API @ 60 °F)	:	44.3	–	44.3
Dodecanes Plus Properties				
Mol %	:	15.49	0.00	0.00
Molecular Weight	:	190.7	–	190.7
Density (gm/cc @ 60 °F)	:	0.8102	–	0.8102
Gravity (°API @ 60 °F)	:	43.0	–	43.0

* (P)ressure : 0 psig * (T)emperature : 60 °F

FIGURE 7

PETROLAB

Company: Premier Oil
Well: White Ibis #1

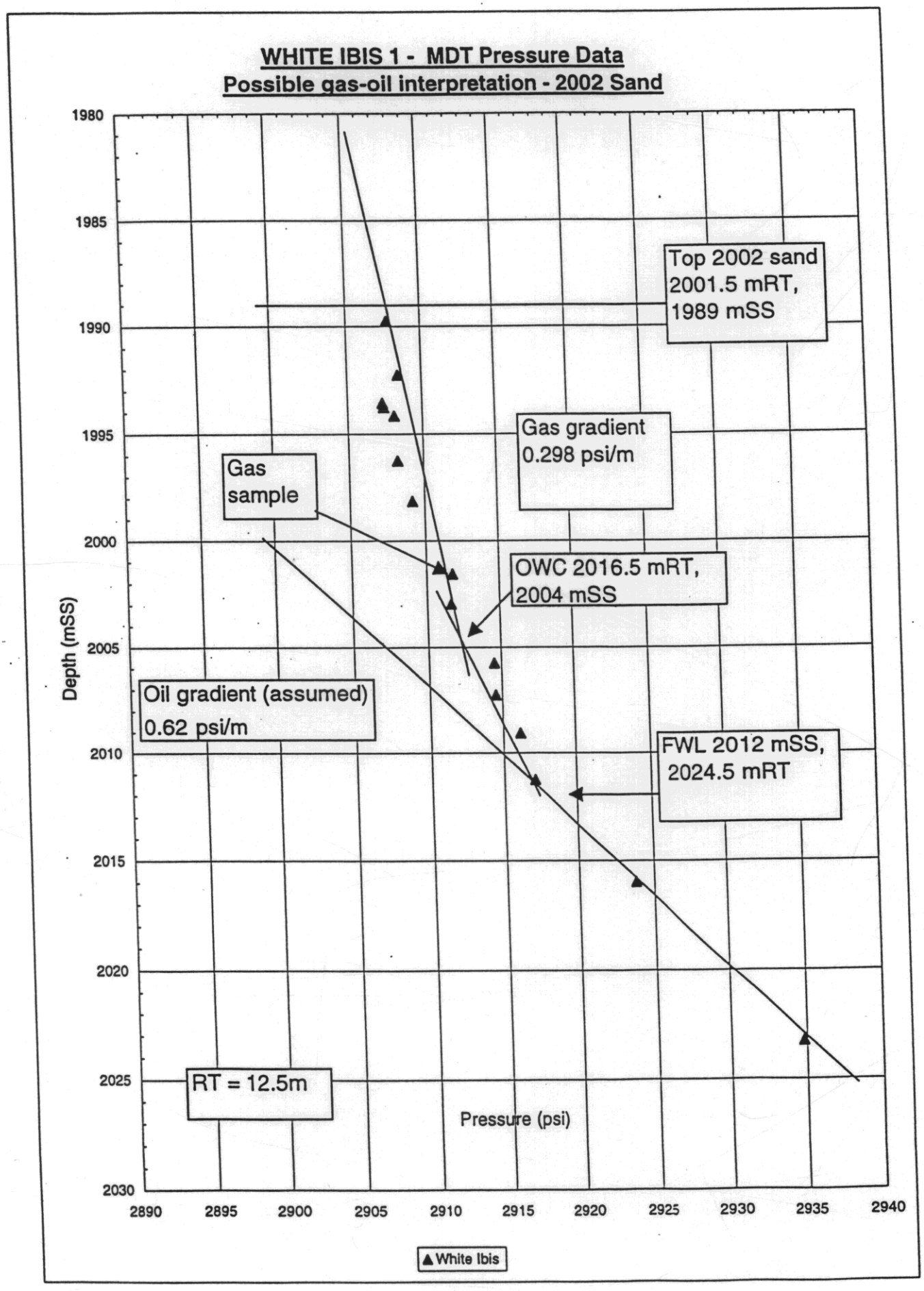
COMPOSITIONAL ANALYSIS OF BOTTOM HOLE SAMPLE
L-013 Depth 2015.2 m From MRSC-BB-139

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	0.13	8.16	8.00
Nitrogen	N2	0.00	1.97	1.93
Methane	C1	0.44	72.33	70.92
Ethane	C2	0.23	5.96	5.85
Propane	C3	0.51	3.61	3.55
Iso-Butane	iC4	0.59	1.63	1.61
N-Butane	nC4	0.73	1.38	1.37
Iso-Pentane	iC5	1.40	0.97	0.98
N-Pentane	nC5	1.29	0.69	0.70
Hexanes	C6	5.78	1.32	1.41
Heptanes	C7	20.63	1.29	1.67
Octanes	C8	17.63	0.43	0.77
Nonanes	C9	15.81	0.18	0.49
Decanes	C10	12.29	0.07	0.31
Undecanes	C11	7.42	0.01	0.16
Dodecanes Plus	C12+	15.13	0.00	0.28
TOTAL		100.00	100.00	100.00
Ratios				
Molar Ratio		0.0196	0.9804	1.0000
Mass Ratio		0.0881	0.9119	1.0000
Liquid Ratio (bbl/bbl)		1.0000 @ SC	–	–
Gas Liquid Ratio		1.0000 bbl @ SC	41551 SCF	–
Stream Properties				
Molecular Weight		122.0	25.21	27.1
Density obs. (gm/cc)		0.7610 @ 60 °F	–	–
Gravity (AIR = 1.000)		54.3 °API @ 60 °F	0.874	–
GHV (BTU/scf)		–	1272	–
Hexanes Plus Properties				
Mol %		94.69	3.30	5.09
Molecular Weight		125.5	95.0	106.1
Density (gm/cc @ 60 °F)		0.7672	0.6823	0.7164
Gravity (°API @ 60 °F)		52.8	75.7	65.8
Heptanes Plus Properties				
Mol %		88.91	1.98	3.68
Molecular Weight		128.2	102.3	114.5
Density (gm/cc @ 60 °F)		0.7711	0.6921	0.7318
Gravity (°API @ 60 °F)		51.8	72.8	61.7
Decanes Plus Properties				
Mol %		34.83	0.08	0.75
Molecular Weight		161.4	84.0	144.7
Density (gm/cc @ 60 °F)		0.8023	0.6661	0.8023
Gravity (°API @ 60 °F)		44.7	80.7	44.7
Undecanes Plus Properties				
Mol %		22.55	0.01	0.44
Molecular Weight		176.3	147.0	172.5
Density (gm/cc @ 60 °F)		0.8128	0.7400	0.8128
Gravity (°API @ 60 °F)		42.4	59.5	42.4
Dodecanes Plus Properties				
Mol %		15.13	0.00	0.28
Molecular Weight		190.7	–	190.7
Density (gm/cc @ 60 °F)		0.8222	–	0.8222
Gravity (°API @ 60 °F)		40.4	–	40.4

* (P)ressure : 0 psig * (T)emperature : 60 °F

570184

FIGURE 8



5 cm

570185

APPENDIX 9

VSP RESULTS AND STC PROCESSING REPORT

By

SCHLUMBERGER GEOQUEST

WHITE IBIS 1

570186

Schlumberger GeoQuest

PREMIER OIL AUSTRALASIA

WELL SEISMIC PROCESSING REPORT

VSP/GEOGRAM

WHITE IBIS-1

FIELD: WILDCAT

COUNTRY: AUSTRALIA

COORDINATES: 039 57' 49.607" S
: 145 15' 17.234" E

DATE OF VSP SURVEY: 29 JUN 1998

REFERENCE NO: AGQ500068/69

INTERVAL: 75.0 m - 2195.7 m

Prepared by:
Dennis Anestoudis (Schlumberger Geoquest)

CONTENTS

1. **Introduction**

2. **Data Acquisition**

3. **Well Seismic Edit**

   3.1 Data quality

   3.2 Transit Time Measurement

   3.3 Correction to Datum

   3.4 Geophysical Airgun Report

4. **Sonic Calibration Processing**

   4.1 Sonic Calibration

   4.2 Open Hole Logs

   4.3 Correction to Datum and Velocity Modeling

   4.4 Sonic Calibration Output

   4.5 Sonic Calibration Results

5. **Synthetic Seismogram Processing**

   5.1 Depth to Time Conversion

   5.2 Primary Reflection Coefficients

   5.3 Primaries with Transmission Loss

   5.4 Primaries plus Multiples

   5.5 Multiples Only

   5.6 Wavelet

   5.7 Polarity Convention

   5.8 Convolution

6. **VSP Processing**

   6.1 Stacking

   6.2 Spherical Divergence Correction and Bandpass Filter

   6.3 Velocity Filter

   6.4 Waveshaping Deconvolution

   6.5 VSP Corridor Stack

   6.6 VSP/GEOGRAM composite presentation

A Summary of Geophysical Listings

A1 Geophysical Airgun Report

A2 Drift Computation Report

A3 Sonic Adjustment Parameter Report

A4 Velocity Report

A5 Time Converted Velocity Report

List of Tables

1 Survey Parameters

2 Sonic Drift

List of Figures

1 Polarity convention

2 3D Power Spectra

3 2D Power Spectra

List of Plots

Plot 1 Stacked data

Plot 2 Amplitude recovery

Plot 3 Velocity Filter

Plot 4 Waveshaping deconvolution

Plot 5 Waveshaping & Corridor stack

Plot 6A VSP, GEOGRAM & LOGS Composite, Normal polarity 20 cm/s.

Plot 6B VSP, GEOGRAM & LOGS Composite, Reverse polarity 20 cm/s

Plot 7A Seismic Calibration Log 22".

Plot 7B Drift Corrected Sonic 11".

Plot 8A GEOGRAM, 25Hz Ricker Wavelet.

Plot 8B GEOGRAM, 35Hz Ricker Wavelet.

Plot 8C GEOGRAM, 45Hz Ricker Wavelet.

1. Introduction

A VSP (Vertical Seismic Profile) was recorded with a Combinable Seismic Imager tool (CSI) at the *White Ibis-1* well. The survey was run on 29th June 1998.

The VSP data was edited and processed using the conventional VSP processing chain for a vertical well. This report describes the processing workflow and explains the parameter choices.

2. Data Acquisition

The data was acquired in one logging run using the three components Dual Combinable Seismic Imager tool (CSI). An array of three Air-Guns was used as the source. The guns were positioned 5 meters below mean sea level. The seismic data was recorded using the Schlumberger Maxis 500 Unit. All raw data was recorded in DLIS format.

Table 1. Survey Parameters

Elevation of KB	12.5 M
Elevation of DF	12.5 M
Elevation of GL	- 61.9 M
Energy Source	3 X 150 cu in. Air-guns
Source Offset	46.0 M
Source Depth	5 M below MSL
Reference Sensor	Hydrophone
Hydrophone Offset	46.0 M
Hydrophone Depth	10 M below MSL
Source & Hyd. Azimuth	135.0 Degrees
Tool Type	CSI
Tool Combination	Stand Alone
De-coupled Geophones	Yes
Shaker Fitted	Yes
Number of Axis	3
Geophone Type	SM-4
Frequency Response	10-150 Hz
Sampling Rate	0.5 ms.
Recording Time	3.0 sec.
Acquisition Unit	MAXIS
Recording Format	DLIS

3. Well Seismic Edit

Each shot of the raw geophone data was evaluated and edited as necessary. The hydrophone data was also evaluated for signature changes and timing shifts.

The good shots at each level were stacked using a median stacking technique, to increase the signal to noise ratio of the data. The transit time of each trace was re-computed after stacking.

3.1 Data Quality

The overall quality of the data is very good. Note the following:

- The vertical component (Z) shows a consistent signature and a high signal to noise ratio, as seen in Plot 1.
- The checkshots transit-times above 1130m are unreliable due to casing noise.

3.2 Transit Time Measurement

The transit time measured, Delta t , corresponds to a difference between arrivals recorded by surface and downhole sensors. The reference time (zero time) is the physical recording of the source signal by accelerometers on the gun or sensors positioned near the source. In this case, a hydrophone positioned 5 m below the gun was used as the reference. First break picking algorithms were used on both the hydrophone and the geophone.

3.3 Correction to Datum

Seismic Reference Datum (SRD) is at Mean Sea Level (MSL).

The source was suspended 5 meters below the sea surface. A hydrophone was attached to the source 5 meters below the outlet ports and was used as the time reference. A static correction of 6.6 msec (OWT) was thus applied to all data to correct it to SRD.

3.4 Geophysical Airgun Report

The Geophysical Airgun Report listing contains all downhole seismic measurements obtained by analyzing stacked shots.

The level number, corresponding KB and SRD depth, observed (non-vertical) transit times and corrected (vertical) transit times from the source and from SRD are listed. Also included are average velocities between SRD and geophone together with level separation and corresponding transit times and finally interval velocities between levels.

Vertical transit times have been corrected for the effects of geometry. The interval velocities listed are those computed from corrected (i.e. vertical) transit times.

4. Sonic Calibration Processing

4.1 Sonic Calibration

A 'drift' curve is obtained using the sonic log and the vertical check level times. The term 'drift' is defined as the seismic time (from check shots) minus the sonic time (from integration of edited sonic). Commonly the word 'drift' is used to identify the above difference, or to identify the gradient of drift versus increasing depth, or to identify a difference of drift between two levels.

The gradient of drift, that is the slope of the drift curve, can be negative or positive.

For a negative drift ($\Delta drift/\Delta depth < 0$) the sonic time is greater than the seismic time over a certain section of the log.

For a positive drift ($\Delta drift/\Delta depth > 0$), the sonic time is less than the seismic time over a certain section of the log.

The drift curve, between two levels, is then an indication of the error on the integrated sonic or an indication of the amount of correction required on the sonic to have the TTI of the corrected sonic match the check shot times.

Two methods of correction to the sonic log are used.

1. Uniform or block shift. This method applies a uniform correction to all the sonic values over the interval. This uniform correction is applied in the case of positive drift and is the average correction represented by the drift curve gradient expressed in μsec/ft .

2. ΔT Minimum. In the case of negative drift a second method is used, called Δ minimum. This applies a differential correction to the sonic log, where it is assumed that the greatest amount of transit time error is caused by the lower velocity sections of the log. Over a given interval the method will correct only Δt values which are higher than a threshold, the Δt_{min} . Values of Δwhich are lower than the threshold are not corrected. The correction is a reduction of the excess of Δt over Δt_{min}, $\Delta t - \Delta t_{min}$.

$\Delta t - \Delta t_{min}$ is reduced through multiplication by a reduction coefficient which remains constant over the interval. This reduction coefficient, named G, can be defined as:

$$G = 1 + \frac{drift}{(\Delta t - \Delta t_{min})dZ}$$

Where drift is the drift over the interval to be corrected and the value $(\Delta t - \Delta t_{min})dZ$ is the time difference between the integrals of the two curves Δt and Δt_{min}. only over the intervals where $\Delta t > \Delta t_{min}$.

Hence the corrected sonic: $\Delta t = G(\Delta t - \Delta t_{min}) + \Delta t_{min}$.

4.2 Open Hole Logs

The AS tool was used to record sonic waveforms. Subsequently STC processing was used to calculate the DT compressional. Reliable compressional data was measured over the depth interval 2214 to 1350 m below KB.

The density log was edited for bad hole condition.

The gamma ray, shear and caliper logs were also included as correlation curves.

4.3 Correction to Datum and Velocity Modeling

The sonic calibration processing has been referenced to mean sea level which is the seismic reference datum . Static corrections are applied to correct for source offset and source depth. A correction for the source depth involves using a water velocity of 1524 m/sec.

4.4 Sonic Calibration Output

Drift Computation Report

The Drift Computation Report contains the basic comparison of raw seismic and edited sonic integrated times at checkshot levels.

The level number, measured depth and vertical depth for all levels, vertical checkshot times adjusted to SRD and corresponding integrated sonic times are compiled in the listing. The drift between two adjacent checkshot levels is listed in milliseconds and the corrections to be applied to the sonic log in μsec/ ft are also listed for all intervals between two adjacent levels .

Sonic adjustment parameter report

This listing shows the depth of selected knees from KB and SRD together with the measured drift. The amount of sonic adjustment and the type of correction (block shift or Delta T Minimum) plus the corresponding reduction factor G if applicable are all printed out.

Drift Computation Report

The Drift Computation Report and Sonic Adjustment Report are graphically summarised on the Drift Curve Plot. The raw and selected (smoothed) drift curves, position of knees, and corresponding drift at all checkshots and knees are all indicated on the Drift Curve Plot.

Raw and Drift Corrected Report Sonic Plot

The effect of the shifts listed in the Sonic Adjustment Parameter Report on the edited sonic log and the results of sonic adjustment for drift are graphically displayed on the Raw and Corrected Sonic Plot.

Drift Computation Report

The interval velocities between two adjacent checkshot levels computed from corrected (adjusted) sonic log are listed in the Velocity Report. The residual errors between checkshots and integrated sonic times after calibration (adjustment) are also listed in the Velocity Report for every checkshot level.

Time and Velocity vs. Depth Plot

Four velocities - Average, Interval, Continuous and Root Mean Square together with Time vs. Depth curve are computed for all checkshot levels. The results are plotted as a function of depth on the Time and Velocity vs. Depth Plot.

Interval velocities (v_{int}) are those computed between two adjacent checkshot levels from corrected sonic logs and listed in the Velocity Report. Interval velocity is defined as

$$v_{int} = z_n - z_{n-1} \text{ over } t_n - t_{n-1}$$

where z_n is the depth of nth layer and t_n its corresponding integrated sonic time.

Average velocities (v_{ave}) are computed by dividing SRD depth of checkshots and their corresponding integrated sonic times from corrected sonic log.

$$v_{ave} = \frac{\sum v_n t_n}{\sum t_n}$$

The continuous velocity curve is an inverse of sonic log displayed not as slowness in μsec/ ft but as velocity in meters/second.

Root Mean Square Velocity (v_{rms}) is computed from calibrated sonic logs by

$$v_{rms} = \sqrt{\frac{\sum v_n^2 t_n}{\sum t_n}}$$

where v_n is an interval velocity over some specific time increment Delta t_n of calibrated sonic log.

The Time vs. Depth Curve is the result of integration of the calibrated sonic log and is plotted as one way time (OWT) against depth.

Time Converted Velocity Report

This listing is obtained from the calibrated sonic log. Average, RMS and Interval velocities are computed at one millisecond intervals one way time (OWT). The results are listed against two way time (TWT) together with corresponding measured (KB) and seismic datum (SRD) depths.

Interval velocities are between two adjacent computations (two milliseconds TWT apart) whereas average and RMS are from SRD.

4.5 Sonic Calibration Results

The drift curve is the correction imposed upon the raw sonic log. A dummy checkshot was introduced at GL in an attempt to generate synthetics from the sea-bottom.

The Seismic Calibration Log (Plot 7A) shows the sonic calibration output in 22" format at a 1:5000 scale.

The Drift Corrected Sonic (Plot 7B) displays the raw and calibrated sonic curves on an 8.5" plot at a 1:200 scale.

The drift is positive for the entire interval, obtaining a cumulative value of just 3.7 ms at TD.

Knees are selected from the raw drift curve and lithological boundaries marked by the well logs. The depths of the knees define the zones for the adjustment.

5. Synthetic Seismogram Processing

GEOGRAM plots were generated using 25, 35 and 45 Hz zero phase Ricker wavelets. The respective GEOGRAMs are shown on Plots 8A, 8B and 8C. The presentations include both normal and reverse polarity.

GEOGRAM processing produces synthetic seismic traces based on reflection coefficients generated form sonic and density measurements in the well-bore. The steps in the processing chain are the following:

- Depth to time conversion
- Reflection coefficient generation
- Attenuation coefficient calculation
- Convolution
- Output

5.1 Depth to Time Conversion

Open hole logs are recorded from the bottom to top with a depth index. This data is converted to a two-way time index and flipped to read form the top to bottom in order to match the seismic section.

5.2 Primary Reflection Coefficients

Sonic and density data are averaged over chosen time intervals (normally 1 or 2 millisecs). Reflection coefficients are then computed using:

$$R = \frac{r_2.v_2 - r_1.v_1}{r_2.v_2 + r_1.v_1}$$

where:

r_1 = density of the layer above the reflection interface
r_2 = density of the layer below the reflection interface
v_1 = compressional wave velocity of the layer above the reflection interface
v_2 = compressional wave velocity of the layer below the reflection interface

This computation is done for 0.5 msec time interval to generate a set of primary reflection coefficients without transmission losses.

5.3 Primaries with Transmission Loss

Transmission loss on two-way attenuation coefficients is computed using:

$$A_n = (1 - R_1^2).(1 - R_2^2).(1 - R_3^2)...(1 - R_n^2)$$

A set of primary reflection coefficients with transmission loss is generated using:

$$Primary_n = R_n.A_{n-1}$$

5.4 Primaries plus Multiples

Multiples are computed from these input reflection coefficients using the transform technique from the top of the well to obtain the impulse response of the earth. The transform outputs primaries plus multiples.

5.5 Multiples Only

By subtracting previously calculated primaries form the above result we obtain multiples only.

5.6 Wavelet

A theoretical wavelet is chosen to use for convolution with the reflection coefficients previously generated. Choices available include:

Klauder wavelet
Ricker zero phase wavelet
Ricker minimum phase wavelet
Butterworth wavelet
User defined wavelet

5.7 Polarity Convention

An increase in acoustic impedance gives a positive reflection coefficient, is written to tape as a negative number and is displayed as a white trough under normal polarity. Polarity conventions are displayed in Figure 1.

5.8 Convolution

The standard procedure of convolving the wavelet with reflection coefficients; the output is the synthetic seismogram.

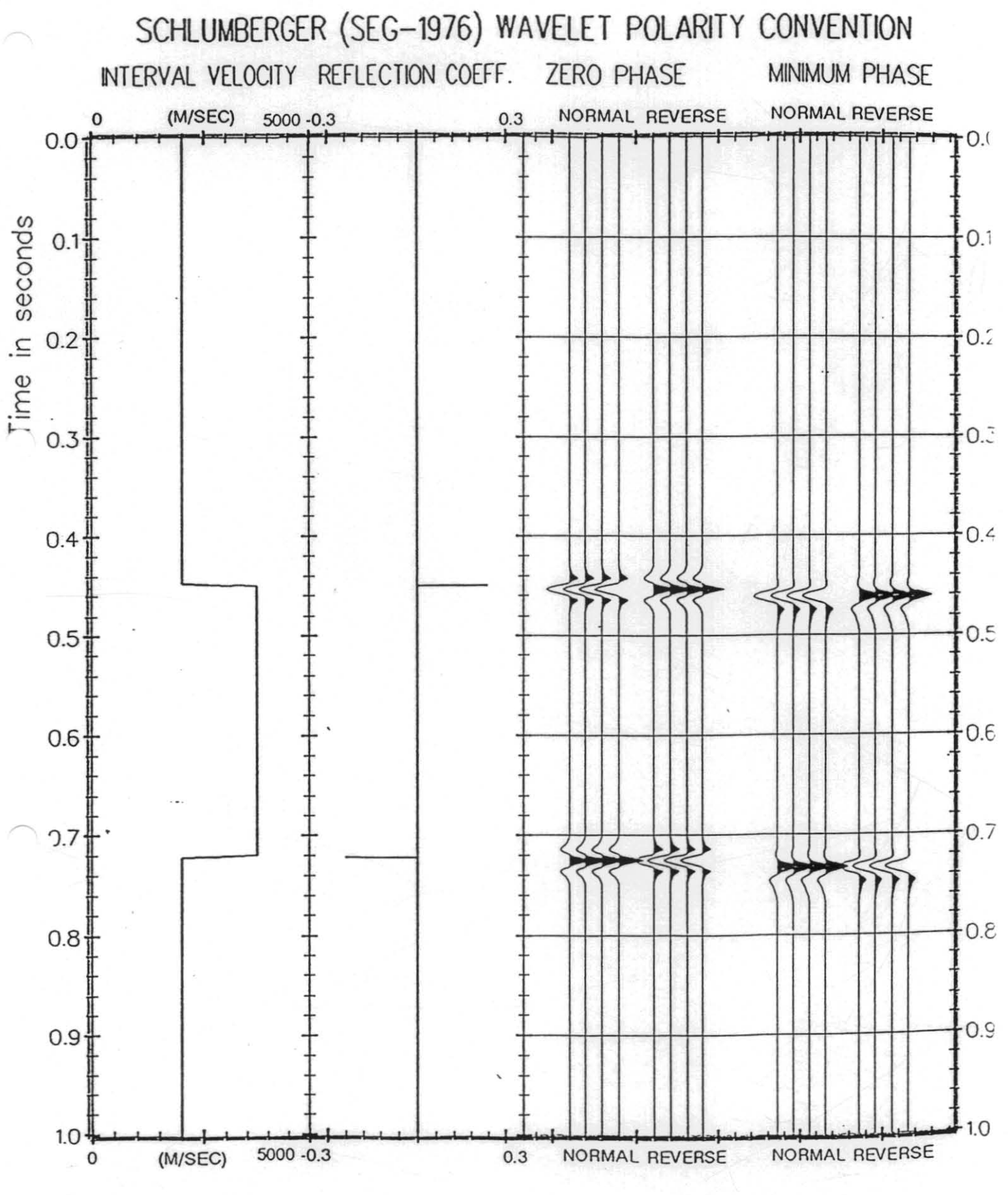


Figure 1 Wavelet Polarity Convention

5 cm

6. VSP Processing

The vertical component of the VSP data was processed using the conventional zero offset vertical incidence processing chain. The following subsections describe the main aspects of the processing chain the final VSP data set.

- edit and sort raw VSP traces
- stack X, Y and Z component
- gain correction and bandpass filter
- up & downgoing wavefield separation
- deconvolution

6.1 Stacking

After splicing, reordering and selecting the raw shots for a median stack was performed on the vertical and horizontal component data. In this method of stacking, at each sample time, the amplitudes of the input traces are read and sorted in ascending order. The output is the median amplitude value from this ordering. If an even number of traces are input, the first is dropped and a median calculated. Then the last is dropped and another median found. The final output is the average of these two median values. The surface sensor (hydrophone) breaks are used as the zero time for stacking. The break time of each trace is recomputed after stacking.(Plot 1)

The power spectrum (squared amplitude) of the vertical component for entire interval is presented in Figure 2. Figure 2 shows the trend of the downgoing wavelet's frequency content with depth. The frequency axis ranges from 0 to 125 Hz. The amplitude scale is in decibels and ranges from 0 to -40dB.

An alternative view of the power spectrum across the whole VSP survey is the 2D map as shown in Figure 3. The contours are the power ratio in decibel units (dB). Th iso-energy lines are every 5 dB.

6.2 Spherical Divergence Correction and Bandpass Filter

A bandpass filter of 5-100 hertz bandwidth was applied and time varying gain function of the exponential form :

$$Gain(T) = \left(\frac{T}{T_0}\right)^{\alpha}$$

where T is the recorded time, T_0 is the first break time and a = 1.2

Trace equalization was applied by normalizing the RMS amplitude of the first break to correct for transmission losses of the direct wave. A normalization window of 40 millisecs was used (Plot 2).

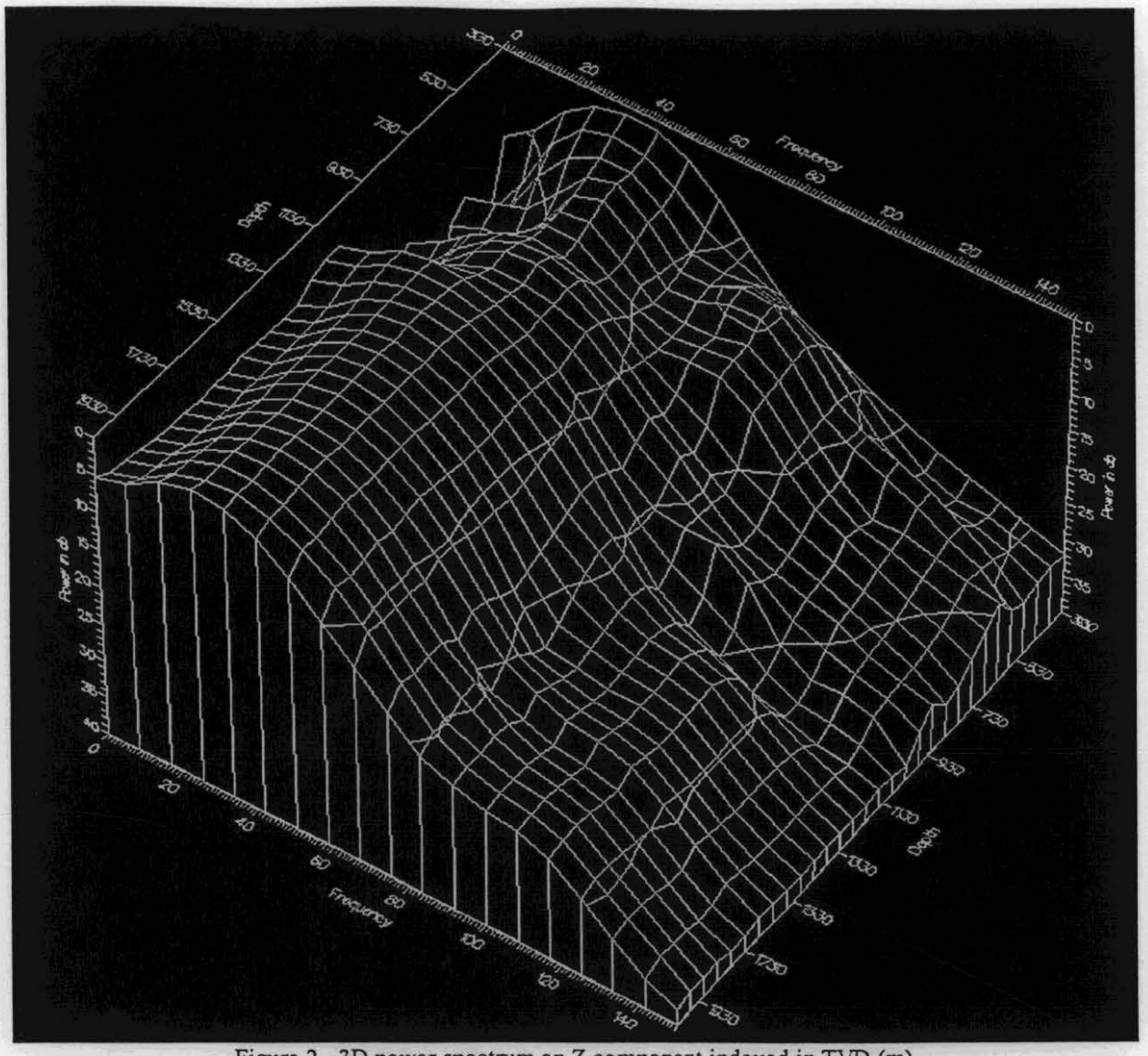
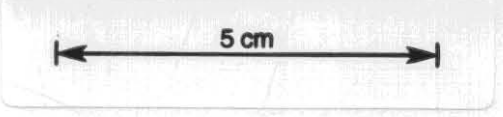


Figure 2. 3D power spectrum on Z component indexed in TVD (m).



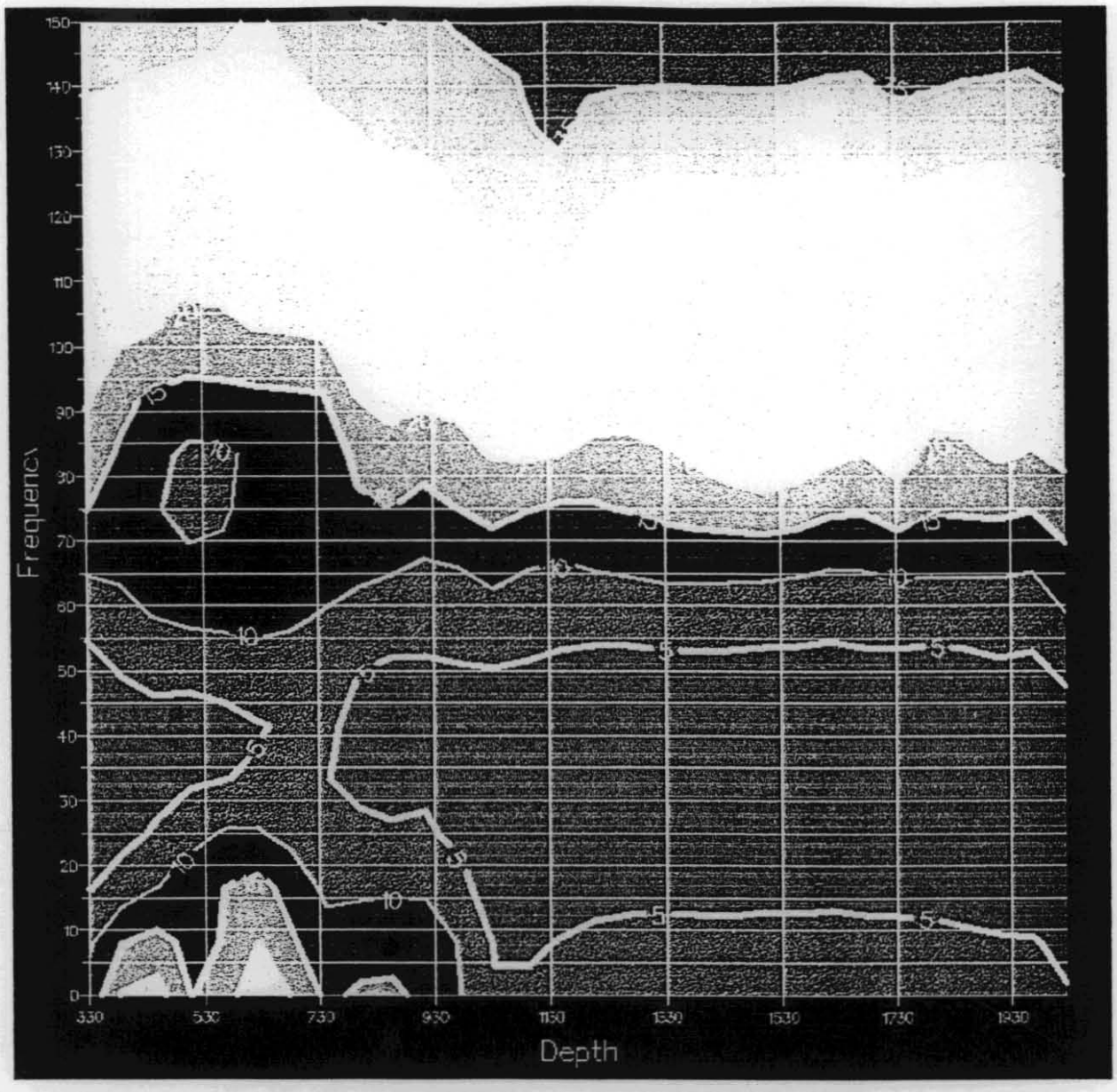
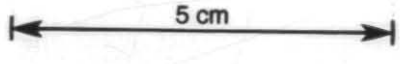


Figure 3. 2D power spectrum on Z component indexed in TVD (m)
Iso-energy lines are every 5 dB



6.3 Velocity filter

A median velocity filter is applied to extract downgoing waves, remove them from wavefields, and to enhance upgoing events.

The downgoing coherent energy is estimated using three levels median velocity filter. The filter array is moved down one level after each computation and the process is repeated level by level over the entire dataset. As a result, the deepest and shallowest levels are lost because of edge effects.

The residual wavefield is obtained by subtracting the downgoing coherent energy from the total wavefield. The residual wavefield is dominated by reflected compressional events (Plot 3).

The upgoing wavefield is enhanced by making a median stack of the upgoing aligned traces using a 7X3 levels filter. The data is now displayed in two way time (Plot 3).

6.4 Waveshaping Deconvolution

The waveshaping deconvolution is applied to remove multiples, source signature effects, and to improve resolution. Downgoing wave is considered to be the wavetrain which is reflected by reflection coefficients, producing the upgoing waves.

The waveshaping deconvolution operator is a double sided operator and is designed trace by trace opening 20 ms before the first break with a window length of 1000 ms. The desired outputs were chosen to be zero phase with a band width of 5-70 Hz. Once the design is made upon the downgoing wavefield, it is applied to the downgoing and subtracted wavefield at the same level. The upgoing compressional wavefield is enhanced in an exactly analogous manner as before. A Butterworth bandpass filter 5-80 Hz was applied after enhancement.

The trace by trace deconvolution is applied in order to collapse the multiple sequence of compressional arrivals, diffractions or out of plane reflections. The result of waveshaping deconvolution on the upgoing wavefield is shown in Plot 4.

6.5 VSP Corrodor Stack

A corridor stack was computed on the data after zero phase waveshaping deconvolution by defining a constant 150 ms timing window along the time depth curve and stacking the data onto a single trace. This trace under normal circumstances should satisfy the assumption of one dimensionality and provide the best seismic representation of the borehole.

Automatic Gain Control (AGC) using a window length of 300 msec was applied to the corridor stack.

The final upgoing wavefield and the corridor stacks are displayed in both polarities Plot 5.

6.6 VSP/Geogram composite presentation

Plots 6A and 6B are composite displays of the VSP data, logged impedance and synthetic seismograms. These displays are a guide to the tie between the Geograms and corridor stack.

There is a fairly good tie between the synthetic seismogram and VSP Plot 6A and 6B. There are some subtle variations on the amplitude of the events. The VSP provides a measure of the earth filter effect whilst the synthetic makes some very basic assumptions to approximate the earth filter effect.

RECOMMENDATIONS

1/ Q Estimation

The method used to estimate attenuation is the spectral ratios method. It consists of extracting the downgoing waves at different levels and computing their spectra. The spectra should show decreasing amplitudes for the higher frequencies as depth increases. The Q estimate can be used to Q compensate the surface seismic frequency bandwidth.

2/ Theoretical Amplitude Recovery Curves

The normalisation factors from the VSP show the exact amplitude decay of the seismic signal as it travel through the subsurface. T^a theoretical amplitude decay curves can be generated and compared to the normalisation factors. The optimum T^a curve can be used during the processing of surface seismic data. An accurate amplitude decay curve leads to a better visual detection of deeper reflectors.

3/ AVO modeling

The STC processing of the AS sonic data generated accurate compressional and shear sonic curves. These curves together with the density curve can be used to model the AVO signatures of selected formations. The most common objectives of such a study are:

a/ To predict the nature of AVO responses at the tops and bases of hydrocarbon bearing sands.

b/ To compare the modeled responses with those seen in the surface seismic data in order to distinguish between real and spurious AVO responses.

c/ Identify events in the seismic data that have useable AVO signatures. Synthetic CMP gather are generated and compared with surface seismic CMP gathers.

A Summary of Geophysical Listings

Five geophysical data listings are appended to this report. Following is a brief description of the format of each listing.

A1 Geophysical Airgun Report

1. Level number: the level number starting from the top level (includes any imposed shots).

2. Measured depth from KB: *dkb*, the depth in metres from kelly bushing.

3. Vertical depth form SRD: *dsrd*, the depth in metres from seismic reference datum.

4. Observed travel time HYD to GEO: *tim*0, the transit time picked form the stacked data by subtracting the surface sensor first break time from the downhole sensor first break time.

5. Vertical travel time SRC to GEO: *timv*, is corrected for source to hydrophone distance and for source offset.

6. Vertical travel time SRD to GEO: *shtm*, is *timv* corrected for the vertical distance between source and datum.

7. Average velocity SRD to GEO: the average seismic velocity from datum to the corresponding checkshot level, $\frac{dsrd}{shtm}$.

8. Delta depth between shots: $\Delta depth$, the vertical distance between each level.

9. Delta time between shots: $\Delta time$, the difference in vertical travel time (*shtm*),between each level.

10. Interval velocity between shots: the average seismic velocity between each level, $\Delta depth/\Delta time$

A2 Drift Computation Report

1. Level number: the level number starting from the top level (includes any imposed shots).

2. Vertical depth from KB: the depth in metres from kelly bushing

3. Vertical depth from SRD: the depth in metres from seismic reference datum.

4. Vertical travel time SRD to GEO: the calculated vertical travel time from datum to downhole geophone (see column 7, Geophysical Airgun Report).

5. Integrated raw sonic time: the raw sonic log is integrated from top to bottom and listed at each level. An initial value at the top of the sonic log is set equal to the checkshot time at that level. This may be an imposed shot if a shot was not taken at the top of the sonic.

6. Computed drift at level: the checkshot time minus the integrated raw sonic time.

7. Computed blk-shft correction: the drift gradient between any two checkshot levels $(\frac{\Delta drift}{\ }) \cdot$

Δ depth

A3 Sonic Adjustment Parameter Report

1. Knee number: the knee number starting from the highest knee. (The first knees listed will generally be at SRD and the top of sonic. The drift imposed at these knees will normally be zero.)

2. Vertical depth from KB: the depth in metres from kelly bushing

3. Vertical depth from SRD: the depth in metres from seismic reference datum.

4. Drift at knee: the value of drift imposed at each knee.

5. Blockshift used: the change in drift divided by the change in depth between any two levels.

6. Delta-T minimum used: see section 4 of report for an explanation of Δt_{min}.

7. reduction factor: see section 4 of report.

8. Equivalent blockshift: the gradient of the imposed drift curve.

A4 Velocity Report

1. Level number: the level number starting from the top level (includes any imposed shots).

2. Vertical depth from KB: the depth in metres form kelly bushing.

3. Vertical depth from SRD: the depth in metres from seismic reference datum.

4. Vertical travel time SRD to GEOPH: the vertical travel time from SRD to downhole geophone (see column 7, Geophysical Airgun Report)

5. Integrated adjusted sonic time: the adjusted sonic log is integrated from top to bottom. An initial value at the top of the sonic is set equal the checkshot time at that level. (the adjusted sonic log is the drift corrected sonic log.)

6. Drift=shot time-raw sonic: the check shot time minus the raw integrated sonic time.

7. Residual=shot time-adj sonic: the check shot time minus the adjusted integrated sonic time. This is the difference between calculated drift and the imposed drift.

8. Adjusted interval velocity: the interval velocity calculated from the integrated adjusted sonic time at each level.

A5 Time Converted Velocity Report

the data in this listing has been resampled in time.

1. Two way travel time from SRD: this is the index for the data in this listing. The first value is at SRD (0 millisecs) and the sampling rate is 2 millisecs.

2. Measured depth from KB: the depth from KB at each corresponding value of two way time.

3. Vertical depth from SRD: the vertical depth from SRD at each corresponding value of two way time.

4. Average velocity SRD to GEO: the vertical depth from SRD divided by half the two way time.

5. RMS velocity: the root mean square velocity from datum to the corresponding value of two way time.

$$v_{rms} = \sqrt{S_1^n v_i^2 t_i / S^n 1 t_i}$$

where v_i is the velocity between each 2 millisecs interval.

6. First normal moveout: the correction time in millisecs to be applied to the two way travel time for a specified moveout distance (default = 1000 M).

$$\Delta t = \sqrt{t^2 + (X/Vrms)^2} - t$$

where:

Δt = normal moveout (secs)
X = moveout distance (metres)
t = two way time (secs)
v_{rms} = rms velocity (metres / sec)

7. Second normal moveout: the correction time in millisecs to be applied to the two way travel tome for a specified moveout distance (default = 1500 M).

8. Third normal moveout: the correction time in millisecs to be applied to the two way travel time for a specified moveout distance (default = 2000 M)

9. Interval velocity: the velocity between each sampled depth. Typically, the sampling rate is 2 millisecs two way time, (1 millisec one way time) therefore the interval velocity will be equal to the depth increment divided by 0.002. It is equivalent to column 9 from the Velocity Report.

LIS TAPE:

FILE#1 (Depth indexed channels): **DEP.001**

DT (adjusted sonic)
DTCO (raw sonic)
GR
RHOB
HCAL

FILE#2 (Time indexed channels): **TIM.002**

DTTM (adjusted sonic)
RHOT
GR
HCAL

SEG-Y TAPE:

FILE#1: Raw data includes the reference hydrophone, X, Y and Z components.
FILE#2: X, Y and Z stacked data.
FILE#3: VSP
FILE#4: Corridor stack
FILE#5: Logs (DTTM,RHOT,GR and HCAL)
FILE#6: 25, 35 and 45 Hz Ricker wavelet GEOGRAMs.

570207

ANALYST: D.ANESTOUDIS 23-JUL-98 14:08:43 PROGRAM: GSHOT 007.E09

SCHLUMBERGER

GEOPHYSICAL AIRGUN REPORT

COMPANY : PREMIER OIL

WELL : WHITE IBIS-1

FIELD : WILDCAT

STATE : TASMANIA

COUNTRY : AUSTRALIA

REFERENCE: AGQ500069

LOGGED : 29-JUN-1998

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MWL
SRD - Elevation of the Seismic Reference Datum Above MSL or MWL
EKB - Elevation of Kelly Bushing
VELHYD - VELOCITY OF THE MEDIUM BETWEEN THE SOURCE AND THE HYDROPHONE
VELSUR - VELOCITY OF THE MEDIUM BETWEEN THE SOURCE AND THE SRD

MATRIX

GUNELZ - SOURCE ELEVATION ABOVE SRD (ONE FOR THE WHOLE JOB; OR ONE PER SHOT)
GUNEWZ - SOURCE DISTANCE FROM THE BOREHOLE AXIS IN EW DIRECTION (CF. GUNELZ)
GUNNSZ - SOURCE DISTANCE FROM THE BOREHOLE AXIS IN NS DIRECTION (CF. GUNELZ)
HYDELZ - HYDROPHONE ELEVATION ABOVE SRD (CF. GUNELZ)
HYDEWZ - HYDROPHONE DISTANCE FROM THE BOREH AXIS IN EW DIRECTION (CF GUNELZ)
HYDNSZ - HYDROPHONE DISTANCE FROM THE BOREH AXIS IN NS DIRECTION (CF GUNELZ)
TRTHYD - TRAVEL TIME FROM THE HYDROPHONE TO THE SOURCE
TRTSRD - TRAVEL TIME FROM THE SOURCE TO THE SRD
DEVEL - DEVIATED WELL DATA PER SHOT : MEAS. DEPTH, VERT. DEPTH, EW, NS

SAMPLED

SHOT.GSH - Shot number
DKB.GSH - Measured Depth from Kelly-Bushing
DSRD.GSH - Depth from SRD
TIMO.GSH - Tie In Memorized Output
TIMV.GSH - Vertical Travel Time from the Source to the Geophone
SHTM.GSH - Shot time (WST)
AVGV.GSH - Average Seismic Velocity
DELZ.GSH - Depth Interval between Successive Shots
DELT.GSH - Travel Time Interval between Successive Shots
INTV.GSH - Internal Velocity, Average

(GLOBAL PARAMETERS)		(VALUE)	
ELEV OF KB AB. MSL (WST)	KB :	12.5000	M
ELEV OF SRD AB. MSL(WST)	SRD :	0	M
Elevation of Kelly Bushi	EKB :	12.5000	M
VEL SOURCE-HYDRO(WST)	VELHYD :	1524.00	M/S
VEL SOURCE-SRD (WST)	VELSUR :	1524.00	M/S

(MATRIX PARAMETERS)

	SOURCE ELV M	SOURCE EW M	SOURCE NS M	HYDRO ELEV M	HYDRO EW M	HYDRO NS M
1	-5.0	32.5	-32.5	-10.0	32.5	-32.5

	TRT HYD-SC MS	TRT SC-SRD MS
1	3.28	3.28

	MD @ KB M	VD @ KB M	VD @ SRD M	E-W COORD M	N-S COORD M
1	74.4	74.4	61.9	0	0
2	1330.0	1330.0	1317.5	0	0
3	1430.0	1430.0	1417.5	0	0
4	1500.0	1500.0	1487.5	0	0
5	1540.0	1540.0	1527.5	0	0
6	1577.0	1577.0	1564.5	0	0
7	1608.0	1608.0	1595.5	0	0
8	1640.0	1640.0	1627.5	0	0
9	1680.0	1680.0	1667.5	0	0
10	1720.0	1720.0	1707.5	0	0
11	1763.0	1763.0	1750.5	0	0
12	1800.0	1800.0	1787.5	0	0
13	1842.0	1842.0	1829.5	0	0
14	1882.0	1882.0	1869.5	0	0
15	1903.0	1903.0	1890.5	0	0
16	1933.0	1933.0	1920.5	0	0
17	1959.0	1959.0	1946.5	0	0
18	1975.0	1975.0	1962.5	0	0
19	1985.0	1985.0	1972.5	0	0
20	2002.0	2002.0	1989.5	0	0
21	2024.0	2024.0	2011.5	0	0
22	2044.0	2044.0	2031.5	0	0
23	2060.0	2060.0	2047.5	0	0
24	2075.0	2075.0	2062.5	0	0
25	2100.0	2100.0	2087.5	0	0
26	2120.0	2120.0	2107.5	0	0
27	2140.0	2140.0	2127.5	0	0
28	2158.0	2158.0	2145.5	0	0
29	2176.0	2176.0	2163.5	0	0
30	2195.7	2195.7	2183.2	0	0

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD M	OBSERV TRAVEL TIME HYD/GEO MS	VERTIC TRAVEL TIME SRC/GEO MS	VERTIC TRAVEL TIME SRD/GEO MS	AVERAGE VELOC SRD/GEO M/S	DELTA DEPTH BETWEEN SHOTS M	DELTA TIME BETWEEN SHOTS MS	INTERV VELOC BETWEEN SHOTS M/S
1	74.4	61.9	44.70	37.31	40.59	1525			
							1255.6	544.81	2305
2	1330.0	1317.5	579.20	582.12	585.40	2251			
							100.0	40.83	2449
3	1430.0	1417.5	620.00	622.95	626.23	2264			
							70.0	24.52	2855
4	1500.0	1487.5	644.50	647.47	650.75	2286			
							40.0	14.11	2835
5	1540.0	1527.5	658.60	661.58	664.86	2297			
							37.0	12.41	2982
6	1577.0	1564.5	671.00	673.99	677.27	2310			
							31.0	10.81	2869
7	1608.0	1595.5	681.80	684.79	688.08	2319			
							32.0	10.31	3105
8	1640.0	1627.5	692.10	695.10	698.38	2330			
							40.0	11.81	3387
9	1680.0	1667.5	703.90	706.91	710.19	2348			
							40.0	12.21	3277
10	1720.0	1707.5	716.10	719.12	722.40	2364			
							43.0	13.21	3256
11	1763.0	1750.5	729.30	732.33	735.61	2380			
							37.0	10.61	3488
12	1800.0	1787.5	739.90	742.93	746.21	2395			
							42.0	12.31	3413
13	1842.0	1829.5	752.20	755.24	758.52	2412			
							40.0	12.71	3148
14	1882.0	1869.5	764.90	767.95	771.23	2424			
							21.0	5.90	3557
15	1903.0	1890.5	770.80	773.85	777.13	2433			
							30.0	8.50	3527
16	1933.0	1920.5	779.30	782.36	785.64	2445			
							26.0	6.70	3878
17	1959.0	1946.5	786.00	789.06	792.34	2457			
							16.0	4.50	3554
18	1975.0	1962.5	790.50	793.56	796.84	2463			
							10.0	3.40	2940
19	1985.0	1972.5	793.90	796.96	800.24	2465			
							17.0	5.40	3147
20	2002.0	1989.5	799.30	802.37	805.65	2469			
							22.0	5.70	3857
21	2024.0	2011.5	805.00	808.07	811.35	2479			
							20.0	5.40	3702
22	2044.0	2031.5	810.40	813.47	816.75	2487			
							16.0	4.60	3477
23	2060.0	2047.5	815.00	818.07	821.35	2493			
							15.0	4.40	3408
24	2075.0	2062.5	819.40	822.48	825.76	2498			

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

LEVEL NUMBER	MEASUR DEPTH FROM KB M	VERTIC DEPTH FROM SRD M	OBSERV TRAVEL TIME HYD/GEO MS	VERTIC TRAVEL TIME SRC/GEO MS	VERTIC TRAVEL TIME SRD/GEO MS	AVERAGE VELOC SRD/GEO M/S	DELTA DEPTH BETWEEN SHOTS M	DELTA TIME BETWEEN SHOTS MS	INTERV VELOC BETWEEN SHOTS M/S
							25.0	6.20	4030
25	2100.0	2087.5	825.60	828.68	831.96	2509			
							20.0	4.50	4442
26	2120.0	2107.5	830.10	833.18	836.46	2520			
							20.0	5.20	3844
27	2140.0	2127.5	835.30	838.38	841.66	2528			
							18.0	4.40	4089
28	2158.0	2145.5	839.70	842.79	846.07	2536			
							18.0	3.40	5290
29	2176.0	2163.5	843.10	846.19	849.47	2547			
							19.7	4.60	4280
30	2195.7	2183.2	847.70	850.79	854.07	2556			

570212

ANALYST: D.ANESTOUDIS 23-JUL-98 14:21:52 PROGRAM: GDRIFT 007.E10

SCHLUMBERGER

DRIFT COMPUTATION REPORT

COMPANY : PREMIER OIL

WELL : WHITE IBIS-1

FIELD : WILDCAT

STATE : TASMANIA

COUNTRY : AUSTRALIA

REFERENCE: AGQ500069

LOGGED : 29-JUN-1998

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MWL
SRD - Elevation of the Seismic Reference Datum Above MSL or MWL
EKB - Elevation of Kelly Bushing
XSTART - TOP OF ZONE PROCESSED BY WST
XSTOP - BOTTOM OF ZONE PROCESSED BY WST
UNFDEN - UNIFORM DENSITY VALUE
GAD001 - RAW SONIC CHANNEL NAME USED FOR WST SONIC ADJUSTMENT

ZONE

LOFDEN - LAYER OPTION FLAG FOR DENSITY : -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
LAYDEN - USER SUPPLIED DENSITY DATA

SAMPLED

SHOT - Shot number
DKB - Measured Depth from Kelly-Bushing
[illegible] - Depth from SRD
SHOM - Shot time (WST)
RAWS - Raw Sonic (WST)
SHDR - Drift at Shot or Knee
BLSH - Block Shift between Shots or Knee

(GLOBAL PARAMETERS)		(VALUE)	
ELEV OF KB AB. MSL (WST)	KB	: 12.5000	M
ELEV OF SRD AB. MSL(WST)	SRD	: 0	M
Elevation of Kelly Bushi	EKB	: 12.5000	M
TOP OF ZONE PROCD (WST)	XSTART	: 0	M
BOT OF ZONE PROCD (WST)	XSTOP	: 0	M
UNIFORM DENSITY VALUE	UNFDEN	: 2.30000	G/C3
RAW SONIC CH NAME (WST)	GAD001	: DTCO.D.002.FLP.IPA.*	

(ZONED PARAMETERS)		(VALUE)		(LIMITS)	
LAYER OPTION FLAG DENS	LOFDEN	:-1.000000		30479.7 -	0
USER SUPPLIED DENSITY DA	LAYDEN	: 0	G/C3	0 -	0

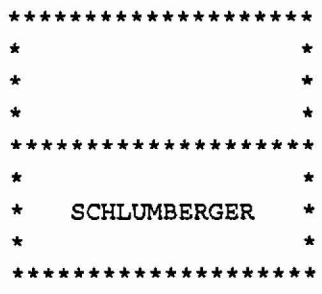
COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL TRAVEL TIME SRD/GEO MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
						0
2	74.4	61.9	40.59	40.59	0	
						-.01
3	1330.0	1317.5	585.40	585.45	-.05	
						2.12
4	1430.0	1417.5	626.23	625.58	.65	
						3.65
5	1500.0	1487.5	650.75	649.26	1.49	
						5.35
6	1540.0	1527.5	664.86	662.67	2.19	
						3.27
7	1577.0	1564.5	677.27	674.68	2.59	
						6.62
8	1608.0	1595.5	688.08	684.82	3.26	
						.12
9	1640.0	1627.5	698.38	695.11	3.27	
						-2.91
10	1680.0	1667.5	710.19	707.30	2.89	
						-.31
11	1720.0	1707.5	722.40	719.55	2.85	
						2.09
12	1763.0	1750.5	735.61	732.46	3.14	
						-2.71
13	1800.0	1787.5	746.21	743.40	2.82	
						-1.44
14	1842.0	1829.5	758.52	755.90	2.62	
						8.18
15	1882.0	1869.5	771.23	767.54	3.69	
						-2.87
16	1903.0	1890.5	777.13	773.64	3.49	
						-.88
17	1933.0	1920.5	785.64	782.23	3.41	
						-4.51
18	1959.0	1946.5	792.34	789.32	3.02	
						-.10
19	1975.0	1962.5	796.84	793.83	3.02	
						20.30
20	1985.0	1972.5	800.24	796.56	3.68	
						14.98
21	2002.0	1989.5	805.65	801.13	4.52	
						-7.84
22	2024.0	2011.5	811.35	807.40	3.95	
						2.05
23	2044.0	2031.5	816.75	812.67	4.09	
						4.77
24	2060.0	2047.5	821.35	817.02	4.34	
						10.21
25	2075.0	2062.5	825.76	820.92	4.84	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL TRAVEL TIME SRD/GEO MS	INTEGRATED RAW SONIC TIME MS	COMPUTED DRIFT AT LEVEL MS	COMPUTED BLK-SHFT CORRECTION US/F
						-5.53
26	2100.0	2087.5	831.96	827.57	4.38	
						-8.46
27	2120.0	2107.5	836.46	832.63	3.83	
						1.80
28	2140.0	2127.5	841.66	837.72	3.95	
						-2.95
29	2158.0	2145.5	846.07	842.29	3.77	
						-2.26
30	2176.0	2163.5	849.47	845.83	3.64	
						1.05
31	2195.7	2183.2	854.07	850.36	3.71	
						0
32	2211.8	2199.3	857.62	853.92	3.71	

ANALYST: D.ANESTOUDIS 23-JUL-98 14:59:32 PROGRAM: GADJST 008.E09



SONIC ADJUSTMENT PARAMETER REPORT

COMPANY : PREMIER OIL

WELL : WHITE IBIS-1

FIELD : WILDCAT

STATE : TASMANIA

COUNTRY : AUSTRALIA

REFERENCE: AGQ500069

LOGGED : 29-JUN-1998

LONG DEFINITIONS

GLOBAL

SRCDRF - ORIGIN OF ADJUSTMENT DATA
CONADJ - CONSTANT ADJUSTMENT TO AUTOMATIC DELTA-T MINIMUM = 7.5 US/F
UNERTH - UNIFORM EARTH VELOCITY (GTRFRM)

ZONE

ZDRIFT - USER DRIFT AT BOTTOM OF THE ZONE
ADJOPZ - TYPE OF ADJUSTMNENT IN THE DRIFT ZONE : 0=DELTA-T MIN, 1=BLOCKSHIFT
ADJUSZ - DELTA-T MINIMUM USED FOR ADJUSTMENT IN THE DRIFT ZONE
LOFVEL - LAYER OPTION FLAG FOR VELOCITY: -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
LAYVEL - USER SUPPLIED VELOCITY DATA

SAMPLED

SHOT - Shot number
VDKB - Vertical Depth Relative to KB
DSRD - Depth from SRD
K - Knee
BS - Block Shift between Shots or Knee
DTMI - Value of Delta-T Minimum used
COEF - Delta-T MIN Coefficient used in the Drift Zone
DRGR - Gradient of Drift Curve

(GLOBAL PARAMETERS)		(VALUE)	
ORIG OF ADJ DATA (WST)	SRCDRF	: 2.00000	
CONS SONIC ADJST (WST)	CONADJ	: 7.50000	US/F
UNIFORM EARTH VELOCITY	UNERTH	: 2133.60	M/S

(ZONED PARAMETERS)		(VALUE)		(LIMITS)	
USER DRIFT ZONE (WST)	ZDRIFT	: 3.700000	MS	2200.00	- 2187.60
		3.700000		2187.50	1997.60
		4.200000		1997.50	1827.60
		3.000000		1827.50	1587.60
		3.100000		1587.50	1317.60
		0		1317.50	12.5000
ADJUSMNT MODE (WST)	ADJOPZ	:-999.2500		30479.7	- 0
USER DELTA-T MIN (WST)	ADJUSZ	:-999.2500	US/F	30479.7	- 0
LAYER OPTION FLAG VELOC	LOFVEL	:-2.000000		30479.7	- 0
USER VELOC (WST)	LAYVEL	: 0	M/S	0	- 0

570218

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

KNEE NUMBER	VERTICAL DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	DRIFT AT KNEE MS	BLOCKSHIFT USED US/F	DELTA-T MINIMUM USED US/F	REDUCTION FACTOR G	EQUIVALENT BLOCKSHIFT US/F
1	12.5	0	0				
				0			0
2	1317.5	1305.0	0				
				3.50			3.50
3	1587.5	1575.0	3.10				
					85.70	.98	-.13
4	1827.5	1815.0	3.00				
				2.15			2.15
5	1997.5	1985.0	4.20				
					69.45	.91	-.80
6	2187.5	2175.0	3.70				
				0			0
7	2200.0	2187.5	3.70				

570219

ANALYST: D.ANESTOUDIS 23-JUL-98 14:59:35 PROGRAM: GADJST 008.E09

SCHLUMBERGER

VELOCITY REPORT

COMPANY : PREMIER OIL

WELL : WHITE IBIS-1

FIELD : WILDCAT

STATE : TASMANIA

COUNTRY : AUSTRALIA

REFERENCE: AGQ500069

LOGGED : 29-JUN-1998

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MWL
SRD - Elevation of the Seismic Reference Datum Above MSL or MWL
EKB - Elevation of Kelly Bushing
UNERTH - UNIFORM EARTH VELOCITY (GTRFRM)

ZONE

LOFVEL - LAYER OPTION FLAG FOR VELOCITY: -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
LAYVEL - USER SUPPLIED VELOCITY DATA

SAMPLED

SHOT - Shot number
DKB - Measured Depth from Kelly-Bushing
DSRD - Depth from SRD
SHTM - Shot time (WST)
ATTS - Adjusted Sonic Travel Time
[illegible] - Drift at Shot or Knee
RESF - Residual Travel Time at Knee
INTV - Internal Velocity, Average

(GLOBAL PARAMETERS)		(VALUE)	
ELEV OF KB AB. MSL (WST)	KB	: 12.5000	M
ELEV OF SRD AB. MSL(WST)	SRD	: 0	M
Elevation of Kelly Bushi	EKB	: 12.5000	M
UNIFORM EARTH VELOCITY	UNERTH	: 2133.60	M/S

(ZONED PARAMETERS)		(VALUE)		(LIMITS)		
LAYER OPTION FLAG VELOC	LOFVEL	:-2.000000		30479.7	-	0
USER VELOC (WST)	LAYVEL	: 0	M/S	0	-	0

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL TRAVEL TIME SRD/GEOPH MS	INTEGRATED ADJUSTED SONIC TIME MS	DRIFT = SHOT TIME - RAW SON MS	RESIDUAL = SHOT TIME - ADJ SON MS	ADJUSTED INTERVAL VELOCITY M/S
							1524
2	74.4	61.9	40.59	40.59	0	.01	
							2304
3	1330.0	1317.5	585.40	585.56	-.05	-.15	
							2424
4	1430.0	1417.5	626.23	626.82	.65	-.59	
							2858
5	1500.0	1487.5	650.75	651.31	1.49	-.56	
							2885
6	1540.0	1527.5	664.86	665.18	2.19	-.32	
							2975
7	1577.0	1564.5	677.27	677.61	2.59	-.34	
							3028
8	1608.0	1595.5	688.08	687.85	3.26	.22	
							3115
9	1640.0	1627.5	698.38	698.12	3.27	.26	
							3286
10	1680.0	1667.5	710.19	710.30	2.89	-.11	
							3270
11	1720.0	1707.5	722.40	722.53	2.85	-.13	
							3333
12	1763.0	1750.5	735.61	735.43	3.14	.18	
							3389
13	1800.0	1787.5	746.21	746.35	2.82	-.13	
							3333
14	1842.0	1829.5	758.52	758.95	2.62	-.43	
							3357
15	1882.0	1869.5	771.23	770.87	3.69	.36	
							3360
16	1903.0	1890.5	777.13	777.12	3.49	.01	
							3409
17	1933.0	1920.5	785.64	785.92	3.41	-.28	
							3574
18	1959.0	1946.5	792.34	793.19	3.02	-.85	
							3463
19	1975.0	1962.5	796.84	797.81	3.02	-.97	
							3571
20	1985.0	1972.5	800.24	800.61	3.68	-.37	
							3662
21	2002.0	1989.5	805.65	805.26	4.52	.39	
							3569
22	2024.0	2011.5	811.35	811.42	3.95	-.07	
							3839
23	2044.0	2031.5	816.75	816.63	4.09	.12	
							3734
24	2060.0	2047.5	821.35	820.91	4.34	.44	
							3884
25	2075.0	2062.5	825.76	824.78	4.84	.98	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

LEVEL NUMBER	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	VERTICAL TRAVEL TIME SRD/GEOPH MS	INTEGRATED ADJUSTED SONIC TIME MS	DRIFT = SHOT TIME - RAW SON MS	RESIDUAL = SHOT TIME - ADJ SON MS	ADJUSTED INTERVAL VELOCITY M/S
							3805
26	2100.0	2087.5	831.96	831.35	4.38	.61	
							3988
27	2120.0	2107.5	836.46	836.36	3.83	.10	
							3970
28	2140.0	2127.5	841.66	841.40	3.95	.27	
							3969
29	2158.0	2145.5	846.07	845.93	3.77	.13	
							5102
30	2176.0	2163.5	849.47	849.46	3.64	.01	
							4342
31	2195.7	2183.2	854.07	854.00	3.71	.07	
							4572
32	2211.8	2199.3	857.62	857.52	3.71	.11	

570223

ANALYST: D.ANESTOUDIS 23-JUL-98 15:28:40 PROGRAM: GTRFRM 001.E14

SCHLUMBERGER

TIME CONVERTED VELOCITY REPORT

COMPANY : PREMIER OIL

WELL : WHITE IBIS-1

FIELD : WILDCAT

STATE : TASMANIA

COUNTRY : AUSTRALIA

REFERENCE: AGQ500069

LOGGED : 29-JUN-1998

LONG DEFINITIONS

GLOBAL

KB - Elevation of the KELLY-BUSHING Above MSL or MWL
SRD - Elevation of the Seismic Reference Datum Above MSL or MWL
GL - Elevation of Users Reference (Generally Ground Level) Above SRD
UNERTH - UNIFORM EARTH VELOCITY (GTRFRM)
UNFDEN - UNIFORM DENSITY VALUE

MATRIX

MVODIS - MOVE-OUT DISTANCE FROM BOREHOLE

ZONE

LOFVEL - LAYER OPTION FLAG FOR VELOCITY: -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
LAYVEL - USER SUPPLIED VELOCITY DATA
LOFDEN - LAYER OPTION FLAG FOR DENSITY : -1=NONE; 0=UNIFORM; 1=UNIFORM+LAYER
LAYDEN - USER SUPPLIED DENSITY DATA

SAMPLED

T.. .' - Two Way Travel Time (Relative to the Seismic Reference)
DKB - Measured Depth from Kelly-Bushing
DSRD - Depth from SRD
AVGV - Average Seismic Velocity
RMSV - Root Mean Square Velocity (Seismic)
MVOT - Normal Move-Out
MVOT - Normal Move-Out
MVOT - Normal Move-Out
INTV - Internal Velocity, Average

(GLOBAL PARAMETERS)			(VALUE)	
ELEV OF KB AB. MSL (WST)	KB	:	12.5000	M
ELEV OF SRD AB. MSL(WST)	SRD	:	0	M
ELEV OF GL AB. SRD(WST)	GL	:	0	M
UNIFORM EARTH VELOCITY	UNERTH	:	2133.60	M/S
FORM DENSITY VALUE	UNFDEN	:	2.30000	G/C3

(MATRIX PARAMETERS)

	MVOUT DIST M
1	1000.0
2	1500.0
3	2000.0

ONED PARAMETERS)		(VALUE)		(LIMITS)		
LAYER OPTION FLAG VELOC	LOFVEL	:-2.000000		30479.7	-	0
USER VELOC (WST)	LAYVEL	: 0	M/S	0	-	0
LAYER OPTION FLAG DENS	LOFDEN	:-1.000000		30479.7	-	0
USER SUPPLIED DENSITY DA	LAYDEN	: 0	G/C3	0	-	0

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								1524
0	12.5	0						
								1524
2.00	14.0	1.5	1524	1524	654.17	982.25	1310.34	
								1524
4.00	15.5	3.0	1524	1524	652.18	980.26	1308.34	
								1524
6.00	17.1	4.6	1524	1524	650.20	978.27	1306.35	
								1524
8.00	18.6	6.1	1524	1524	648.22	976.28	1304.36	
								1524
10.00	20.1	7.6	1524	1524	646.24	974.30	1302.37	
								1524
12.00	21.6	9.1	1524	1524	644.28	972.32	1300.39	
								1524
14.00	23.2	10.7	1524	1524	642.32	970.35	1298.41	
								1524
16.00	24.7	12.2	1524	1524	640.36	968.38	1296.43	
								1524
18.00	26.2	13.7	1524	1524	638.41	966.42	1294.46	
								1524
20.00	27.7	15.2	1524	1524	636.47	964.46	1292.49	
								1524
22.00	29.3	16.8	1524	1524	634.54	962.50	1290.52	
								1524
24.00	30.8	18.3	1524	1524	632.61	960.54	1288.56	
								1524
26.00	32.3	19.8	1524	1524	630.68	958.60	1286.59	
								1524
28.00	33.8	21.3	1524	1524	628.77	956.65	1284.63	
								1524
30.00	35.4	22.9	1524	1524	626.85	954.71	1282.68	
								1524
32.00	36.9	24.4	1524	1524	624.95	952.77	1280.73	
								1524
34.00	38.4	25.9	1524	1524	623.05	950.84	1278.78	
								1524
36.00	39.9	27.4	1524	1524	621.15	948.91	1276.83	
								1524
38.00	41.5	29.0	1524	1524	619.27	946.99	1274.89	
								1524
40.00	43.0	30.5	1524	1524	617.39	945.06	1272.95	
								1524
42.00	44.5	32.0	1524	1524	615.51	943.15	1271.01	
								1524
44.00	46.0	33.5	1524	1524	613.64	941.24	1269.07	
								1524
46.00	47.6	35.1	1524	1524	611.78	939.33	1267.14	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								1524
48.00	49.1	36.6	1524	1524	609.92	937.42	1265.21	
								1524
50.00	50.6	38.1	1524	1524	608.07	935.52	1263.29	
								1524
52.00	52.1	39.6	1524	1524	606.23	933.62	1261.37	
								1524
54.00	53.6	41.1	1524	1524	604.39	931.73	1259.45	
								1524
56.00	55.2	42.7	1524	1524	602.55	929.84	1257.53	
								1524
58.00	56.7	44.2	1524	1524	600.73	927.96	1255.62	
								1524
60.00	58.2	45.7	1524	1524	598.91	926.08	1253.71	
								1524
62.00	59.7	47.2	1524	1524	597.09	924.20	1251.80	
								1524
64.00	61.3	48.8	1524	1524	595.28	922.33	1249.90	
								1524
66.00	62.8	50.3	1524	1524	593.48	920.46	1247.99	
								1524
68.00	64.3	51.8	1524	1524	591.68	918.60	1246.10	
								1524
70.00	65.8	53.3	1524	1524	589.89	916.74	1244.20	
								1524
72.00	67.4	54.9	1524	1524	588.11	914.88	1242.31	
								1524
74.00	68.9	56.4	1524	1524	586.33	913.03	1240.42	
								1524
76.00	70.4	57.9	1524	1524	584.55	911.18	1238.53	
								1524
78.00	71.9	59.4	1524	1524	582.79	909.34	1236.65	
								1524
80.00	73.5	61.0	1524	1524	581.03	907.50	1234.77	
								1809
82.00	75.3	62.8	1531	1532	576.05	900.81	1226.41	
								2237
84.00	77.5	65.0	1548	1552	565.74	886.07	1207.31	
								2237
86.00	79.7	67.2	1564	1571	556.15	872.41	1189.63	
								2237
88.00	82.0	69.5	1579	1590	547.19	859.69	1173.21	
								2238
90.00	84.2	71.7	1594	1607	538.79	847.81	1157.89	
								2238
92.00	86.5	74.0	1608	1623	530.89	836.66	1143.55	
								2238
94.00	88.7	76.2	1621	1639	523.44	826.17	1130.09	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2238
96.00	90.9	78.4	1634	1653	516.38	816.28	1117.43	
								2238
98.00	93.2	80.7	1646	1667	509.69	806.93	1105.47	
								2239
100.00	95.4	82.9	1658	1681	503.32	798.05	1094.15	
								2239
102.00	97.6	85.1	1670	1693	497.26	789.62	1083.42	
								2239
104.00	99.9	87.4	1681	1706	491.46	781.59	1073.22	
								2239
106.00	102.1	89.6	1691	1717	485.91	773.93	1063.50	
								2240
108.00	104.4	91.9	1701	1728	480.59	766.60	1054.23	
								2240
110.00	106.6	94.1	1711	1739	475.49	759.58	1045.37	
								2240
112.00	108.8	96.3	1720	1749	470.57	752.84	1036.88	
								2240
114.00	111.1	98.6	1730	1759	465.84	746.36	1028.74	
								2241
116.00	113.3	100.8	1738	1768	461.27	740.13	1020.92	
								2241
118.00	115.6	103.1	1747	1777	456.85	734.13	1013.39	
								2241
120.00	117.8	105.3	1755	1786	452.58	728.33	1006.15	
								2241
122.00	120.0	107.5	1763	1795	448.45	722.73	999.15	
								2242
124.00	122.3	109.8	1771	1803	444.44	717.31	992.40	
								2242
126.00	124.5	112.0	1778	1810	440.55	712.06	985.88	
								2242
128.00	126.8	114.3	1786	1818	436.77	706.97	979.56	
								2242
130.00	129.0	116.5	1793	1825	433.09	702.03	973.44	
								2242
132.00	131.3	118.8	1799	1832	429.51	697.24	967.50	
								2243
134.00	133.5	121.0	1806	1839	426.02	692.57	961.74	
								2243
136.00	135.7	123.2	1812	1846	422.63	688.03	956.14	
								2243
138.00	138.0	125.5	1819	1852	419.31	683.60	950.69	
								2243
140.00	140.2	127.7	1825	1858	416.07	679.29	945.39	
								2244
142.00	142.5	130.0	1831	1864	412.91	675.08	940.22	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
144.00	144.7	132.2	1836	1870	409.82	670.98	935.19	2244
146.00	147.0	134.5	1842	1876	406.79	666.96	930.28	2244
148.00	149.2	136.7	1847	1881	403.83	663.04	925.48	2244
150.00	151.5	139.0	1853	1886	400.93	659.20	920.80	2245
152.00	153.7	141.2	1858	1892	398.09	655.45	916.22	2245
154.00	155.9	143.4	1863	1897	395.31	651.77	911.74	2245
156.00	158.2	145.7	1868	1901	392.57	648.16	907.35	2245
158.00	160.4	147.9	1873	1906	389.89	644.63	903.06	2246
160.00	162.7	150.2	1877	1911	387.26	641.16	898.85	2246
162.00	164.9	152.4	1882	1915	384.67	637.76	894.73	2246
164.00	167.2	154.7	1886	1920	382.13	634.42	890.68	2246
166.00	169.4	156.9	1891	1924	379.64	631.13	886.71	2247
168.00	171.7	159.2	1895	1928	377.18	627.91	882.82	2247
170.00	173.9	161.4	1899	1932	374.76	624.74	878.99	2247
172.00	176.2	163.7	1903	1936	372.39	621.62	875.23	2247
174.00	178.4	165.9	1907	1940	370.05	618.55	871.53	2248
176.00	180.7	168.2	1911	1944	367.75	615.53	867.89	2248
178.00	182.9	170.4	1915	1947	365.48	612.55	864.31	2248
180.00	185.1	172.6	1918	1951	363.24	609.62	860.79	2248
182.00	187.4	174.9	1922	1955	361.04	606.74	857.33	2249
184.00	189.6	177.1	1926	1958	358.87	603.89	853.91	2249
186.00	191.9	179.4	1929	1961	356.73	601.09	850.55	2249
188.00	194.1	181.6	1932	1965	354.62	598.32	847.23	2249
190.00	196.4	183.9	1936	1968	352.54	595.59	843.96	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2347
960.00	1080.9	1068.4	2226	2236	99.04	211.12	352.04	
								2348
962.00	1083.3	1070.8	2226	2237	98.83	210.72	351.44	
								2348
964.00	1085.6	1073.1	2226	2237	98.63	210.32	350.84	
								2348
966.00	1088.0	1075.5	2227	2237	98.42	209.92	350.25	
								2349
968.00	1090.3	1077.8	2227	2237	98.22	209.52	349.65	
								2349
970.00	1092.7	1080.2	2227	2237	98.01	209.13	349.06	
								2349
972.00	1095.0	1082.5	2227	2238	97.81	208.73	348.46	
								2349
974.00	1097.4	1084.9	2228	2238	97.61	208.34	347.87	
								2350
976.00	1099.7	1087.2	2228	2238	97.41	207.95	347.28	
								2350
978.00	1102.1	1089.6	2228	2238	97.21	207.56	346.70	
								2350
980.00	1104.4	1091.9	2228	2239	97.01	207.17	346.11	
								2350
982.00	1106.8	1094.3	2229	2239	96.81	206.78	345.53	
								2351
984.00	1109.1	1096.6	2229	2239	96.61	206.40	344.95	
								2351
986.00	1111.5	1099.0	2229	2239	96.41	206.01	344.36	
								2351
988.00	1113.8	1101.3	2229	2240	96.21	205.63	343.79	
								2352
990.00	1116.2	1103.7	2230	2240	96.02	205.24	343.21	
								2352
992.00	1118.5	1106.0	2230	2240	95.82	204.86	342.63	
								2352
994.00	1120.9	1108.4	2230	2240	95.63	204.48	342.06	
								2352
996.00	1123.2	1110.7	2230	2240	95.43	204.10	341.48	
								2353
998.00	1125.6	1113.1	2231	2241	95.24	203.72	340.91	
								2353
1000.00	1127.9	1115.4	2231	2241	95.05	203.35	340.34	
								2353
1002.00	1130.3	1117.8	2231	2241	94.86	202.97	339.78	
								2353
1004.00	1132.7	1120.2	2231	2241	94.66	202.60	339.21	
								2354
1006.00	1135.0	1122.5	2232	2242	94.47	202.22	338.64	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2354
1008.00	1137.4	1124.9	2232	2242	94.28	201.85	338.08	
								2354
1010.00	1139.7	1127.2	2232	2242	94.10	201.48	337.52	
								2355
1012.00	1142.1	1129.6	2232	2242	93.91	201.11	336.96	
								2355
1014.00	1144.4	1131.9	2233	2243	93.72	200.74	336.40	
								2355
1016.00	1146.8	1134.3	2233	2243	93.53	200.38	335.84	
								2355
1018.00	1149.1	1136.6	2233	2243	93.35	200.01	335.29	
								2356
1020.00	1151.5	1139.0	2233	2243	93.16	199.64	334.73	
								2356
1022.00	1153.8	1141.3	2234	2243	92.98	199.28	334.18	
								2356
1024.00	1156.2	1143.7	2234	2244	92.79	198.92	333.63	
								2357
1026.00	1158.6	1146.1	2234	2244	92.61	198.56	333.08	
								2357
1028.00	1160.9	1148.4	2234	2244	92.42	198.20	332.53	
								2357
1030.00	1163.3	1150.8	2235	2244	92.24	197.84	331.99	
								2357
1032.00	1165.6	1153.1	2235	2245	92.06	197.48	331.44	
								2358
1034.00	1168.0	1155.5	2235	2245	91.88	197.12	330.90	
								2358
1036.00	1170.3	1157.8	2235	2245	91.70	196.77	330.35	
								2358
.038.00	1172.7	1160.2	2235	2245	91.52	196.41	329.81	
								2358
1040.00	1175.1	1162.6	2236	2245	91.34	196.06	329.27	
								2359
1042.00	1177.4	1164.9	2236	2246	91.16	195.70	328.74	
								2359
1044.00	1179.8	1167.3	2236	2246	90.98	195.35	328.20	
								2359
1046.00	1182.1	1169.6	2236	2246	90.81	195.00	327.67	
								2360
1048.00	1184.5	1172.0	2237	2246	90.63	194.65	327.13	
								2360
1050.00	1186.9	1174.4	2237	2247	90.45	194.31	326.60	
								2360
1052.00	1189.2	1176.7	2237	2247	90.28	193.96	326.07	
								2360
1054.00	1191.6	1179.1	2237	2247	90.10	193.61	325.54	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2361
1056.00	1193.9	1181.4	2238	2247	89.93	193.27	325.01	
								2361
1058.00	1196.3	1183.8	2238	2247	89.75	192.92	324.49	
								2361
1060.00	1198.7	1186.2	2238	2248	89.58	192.58	323.96	
								2362
1062.00	1201.0	1188.5	2238	2248	89.41	192.24	323.44	
								2362
1064.00	1203.4	1190.9	2239	2248	89.24	191.90	322.92	
								2362
1066.00	1205.7	1193.2	2239	2248	89.07	191.56	322.40	
								2362
1068.00	1208.1	1195.6	2239	2249	88.90	191.22	321.88	
								2363
1070.00	1210.5	1198.0	2239	2249	88.73	190.88	321.36	
								2363
1072.00	1212.8	1200.3	2239	2249	88.56	190.55	320.84	
								2363
1074.00	1215.2	1202.7	2240	2249	88.39	190.21	320.33	
								2363
1076.00	1217.6	1205.1	2240	2249	88.22	189.88	319.81	
								2364
1078.00	1219.9	1207.4	2240	2250	88.05	189.54	319.30	
								2364
1080.00	1222.3	1209.8	2240	2250	87.88	189.21	318.79	
								2364
1082.00	1224.7	1212.2	2241	2250	87.72	188.88	318.28	
								2365
1084.00	1227.0	1214.5	2241	2250	87.55	188.55	317.77	
								2365
1086.00	1229.4	1216.9	2241	2251	87.39	188.22	317.27	
								2365
1088.00	1231.7	1219.2	2241	2251	87.22	187.89	316.76	
								2365
1090.00	1234.1	1221.6	2241	2251	87.06	187.56	316.26	
								2366
1092.00	1236.5	1224.0	2242	2251	86.89	187.24	315.75	
								2366
1094.00	1238.8	1226.3	2242	2251	86.73	186.91	315.25	
								2366
1096.00	1241.2	1228.7	2242	2252	86.57	186.59	314.75	
								2367
1098.00	1243.6	1231.1	2242	2252	86.41	186.26	314.25	
								2367
1100.00	1245.9	1233.4	2243	2252	86.24	185.94	313.75	
								2367
1102.00	1248.3	1235.8	2243	2252	86.08	185.62	313.26	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2367
1104.00	1250.7	1238.2	2243	2252	85.92	185.30	312.76	
								2368
1106.00	1253.0	1240.5	2243	2253	85.76	184.98	312.27	
								2368
1108.00	1255.4	1242.9	2244	2253	85.60	184.66	311.78	
								2368
1110.00	1257.8	1245.3	2244	2253	85.44	184.34	311.29	
								2368
1112.00	1260.2	1247.7	2244	2253	85.29	184.03	310.80	
								2369
1114.00	1262.5	1250.0	2244	2254	85.13	183.71	310.31	
								2369
1116.00	1264.9	1252.4	2244	2254	84.97	183.40	309.82	
								2369
1118.00	1267.3	1254.8	2245	2254	84.81	183.08	309.33	
								2369
1120.00	1269.6	1257.1	2245	2254	84.66	182.77	308.85	
								2370
1122.00	1272.0	1259.5	2245	2254	84.50	182.46	308.37	
								2370
1124.00	1274.4	1261.9	2245	2255	84.35	182.15	307.88	
								2371
1126.00	1276.7	1264.2	2246	2255	84.19	181.84	307.40	
								2371
1128.00	1279.1	1266.6	2246	2255	84.04	181.53	306.92	
								2371
1130.00	1281.5	1269.0	2246	2255	83.89	181.22	306.45	
								2371
1132.00	1283.9	1271.4	2246	2255	83.73	180.91	305.97	
								2371
1134.00	1286.2	1273.7	2246	2256	83.58	180.60	305.49	
								2372
1136.00	1288.6	1276.1	2247	2256	83.43	180.30	305.02	
								2372
1138.00	1291.0	1278.5	2247	2256	83.28	179.99	304.54	
								2372
1140.00	1293.3	1280.8	2247	2256	83.13	179.69	304.07	
								2373
1142.00	1295.7	1283.2	2247	2256	82.97	179.39	303.60	
								2373
1144.00	1298.1	1285.6	2248	2257	82.82	179.08	303.13	
								2373
1146.00	1300.5	1288.0	2248	2257	82.68	178.78	302.66	
								2373
1148.00	1302.8	1290.3	2248	2257	82.53	178.48	302.20	
								2374
1150.00	1305.2	1292.7	2248	2257	82.38	178.18	301.73	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2374
1152.00	1307.6	1295.1	2248	2258	82.23	177.89	301.26	
								2375
1154.00	1310.0	1297.5	2249	2258	82.08	177.59	300.80	
								2375
1156.00	1312.3	1299.8	2249	2258	81.93	177.29	300.34	
								2375
1158.00	1314.7	1302.2	2249	2258	81.79	177.00	299.88	
								2375
1160.00	1317.1	1304.6	2249	2258	81.64	176.70	299.42	
								2324
1162.00	1319.4	1306.9	2249	2258	81.50	176.42	298.98	
								2313
1164.00	1321.7	1309.2	2250	2259	81.37	176.14	298.55	
								2313
1166.00	1324.0	1311.5	2250	2259	81.23	175.87	298.12	
								2313
1168.00	1326.3	1313.8	2250	2259	81.09	175.59	297.69	
								2313
1170.00	1328.7	1316.2	2250	2259	80.96	175.32	297.26	
								2330
1172.00	1331.0	1318.5	2250	2259	80.82	175.04	296.83	
								2335
1174.00	1333.3	1320.8	2250	2259	80.68	174.76	296.39	
								2480
1176.00	1335.8	1323.3	2251	2259	80.52	174.44	295.90	
								2452
1178.00	1338.3	1325.8	2251	2260	80.37	174.14	295.42	
								2317
1180.00	1340.6	1328.1	2251	2260	80.24	173.87	294.99	
								2166
1182.00	1342.7	1330.2	2251	2260	80.12	173.63	294.63	
								2168
1184.00	1344.9	1332.4	2251	2260	80.01	173.40	294.27	
								2156
1186.00	1347.1	1334.6	2251	2259	79.89	173.17	293.91	
								2330
1188.00	1349.4	1336.9	2251	2260	79.76	172.89	293.48	
								2349
1190.00	1351.7	1339.2	2251	2260	79.62	172.62	293.05	
								2241
1192.00	1354.0	1341.5	2251	2260	79.50	172.37	292.66	
								2295
1194.00	1356.3	1343.8	2251	2260	79.37	172.11	292.26	
								2191
1196.00	1358.5	1346.0	2251	2260	79.25	171.87	291.89	
								2307
1198.00	1360.8	1348.3	2251	2260	79.12	171.61	291.48	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
1200.00	1363.0	1350.5	2251	2260	79.00	171.36	291.08	2273
1202.00	1365.4	1352.9	2251	2260	78.86	171.08	290.65	2365
1204.00	1367.8	1355.3	2251	2260	78.72	170.80	290.21	2404
1206.00	1370.3	1357.8	2252	2260	78.58	170.51	289.74	2446
1208.00	1372.7	1360.2	2252	2261	78.44	170.23	289.30	2394
1210.00	1375.2	1362.7	2252	2261	78.28	169.91	288.80	2546
1212.00	1377.5	1365.0	2253	2261	78.15	169.64	288.39	2341
1214.00	1379.9	1367.4	2253	2261	78.02	169.38	287.97	2335
1216.00	1382.4	1369.9	2253	2262	77.87	169.07	287.48	2542
1218.00	1384.8	1372.3	2253	2262	77.74	168.79	287.05	2393
1220.00	1387.2	1374.7	2254	2262	77.60	168.52	286.61	2398
1222.00	1389.6	1377.1	2254	2263	77.47	168.25	286.18	2387
1224.00	1391.9	1379.4	2254	2263	77.34	167.98	285.77	2346
1226.00	1394.2	1381.7	2254	2263	77.22	167.75	285.41	2233
1228.00	1396.6	1384.1	2254	2263	77.09	167.48	284.97	2405
1230.00	1399.0	1386.5	2254	2263	76.96	167.20	284.54	2414
1232.00	1401.5	1389.0	2255	2264	76.81	166.91	284.07	2506
1234.00	1404.1	1391.6	2255	2264	76.66	166.60	283.58	2556
1236.00	1406.7	1394.2	2256	2265	76.51	166.28	283.08	2599
1238.00	1409.3	1396.8	2256	2265	76.35	165.96	282.57	2603
1240.00	1411.9	1399.4	2257	2266	76.19	165.63	282.05	2644
1242.00	1414.5	1402.0	2258	2266	76.04	165.33	281.57	2558
1244.00	1417.0	1404.5	2258	2267	75.90	165.04	281.10	2523
1246.00	1419.6	1407.1	2259	2267	75.75	164.73	280.61	2584

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2478
1248.00	1422.0	1409.5	2259	2268	75.61	164.45	280.16	
								2580
1250.00	1424.6	1412.1	2259	2268	75.46	164.14	279.68	
								2807
1252.00	1427.4	1414.9	2260	2269	75.29	163.78	279.10	
								3087
1254.00	1430.5	1418.0	2262	2271	75.08	163.34	278.39	
								3157
1256.00	1433.7	1421.2	2263	2273	74.85	162.88	277.65	
								2888
1258.00	1436.6	1424.1	2264	2274	74.67	162.50	277.04	
								3047
1260.00	1439.6	1427.1	2265	2275	74.47	162.08	276.36	
								2869
1262.00	1442.5	1430.0	2266	2276	74.29	161.71	275.77	
								2898
1264.00	1445.4	1432.9	2267	2277	74.11	161.33	275.17	
								2919
1266.00	1448.3	1435.8	2268	2278	73.92	160.95	274.55	
								2814
1268.00	1451.1	1438.6	2269	2279	73.75	160.60	273.99	
								2759
1270.00	1453.9	1441.4	2270	2280	73.59	160.27	273.45	
								2776
1272.00	1456.6	1444.1	2271	2281	73.43	159.93	272.91	
								2753
1274.00	1459.4	1446.9	2271	2282	73.27	159.60	272.38	
								2765
1276.00	1462.2	1449.7	2272	2283	73.11	159.26	271.85	
								2779
1278.00	1464.9	1452.4	2273	2284	72.95	158.93	271.31	
								2807
1280.00	1467.8	1455.3	2274	2284	72.78	158.59	270.76	
								2785
1282.00	1470.5	1458.0	2275	2285	72.62	158.25	270.23	
								2817
1284.00	1473.4	1460.9	2275	2286	72.46	157.91	269.68	
								2838
1286.00	1476.2	1463.7	2276	2287	72.29	157.57	269.13	
								2820
1288.00	1479.0	1466.5	2277	2288	72.13	157.23	268.58	
								2770
1290.00	1481.8	1469.3	2278	2289	71.97	156.91	268.06	
								2827
1292.00	1484.6	1472.1	2279	2290	71.81	156.57	267.52	
								2905
1294.00	1487.5	1475.0	2280	2291	71.64	156.22	266.95	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2886
1296.00	1490.4	1477.9	2281	2292	71.47	155.87	266.38	
								2859
1298.00	1493.3	1480.8	2282	2293	71.31	155.53	265.83	
								2839
1300.00	1496.1	1483.6	2282	2294	71.14	155.19	265.30	
								2945
1302.00	1499.0	1486.5	2283	2295	70.97	154.83	264.72	
								2875
1304.00	1501.9	1489.4	2284	2296	70.81	154.49	264.17	
								2839
1306.00	1504.8	1492.3	2285	2297	70.65	154.16	263.64	
								2821
1308.00	1507.6	1495.1	2286	2298	70.49	153.84	263.11	
								2881
1310.00	1510.5	1498.0	2287	2299	70.33	153.50	262.57	
								2881
1312.00	1513.3	1500.8	2288	2300	70.17	153.17	262.03	
								2850
1314.00	1516.2	1503.7	2289	2301	70.01	152.84	261.50	
								2870
1316.00	1519.1	1506.6	2290	2302	69.86	152.51	260.96	
								2888
1318.00	1521.9	1509.4	2291	2303	69.70	152.18	260.42	
								2924
1320.00	1524.9	1512.4	2291	2304	69.53	151.84	259.87	
								2966
1322.00	1527.8	1515.3	2292	2305	69.37	151.49	259.31	
								2899
1324.00	1530.7	1518.2	2293	2306	69.21	151.16	258.77	
								2922
1326.00	1533.7	1521.2	2294	2307	69.05	150.82	258.23	
								2868
1328.00	1536.5	1524.0	2295	2308	68.89	150.50	257.71	
								2896
1330.00	1539.4	1526.9	2296	2309	68.74	150.17	257.18	
								2902
1332.00	1542.3	1529.8	2297	2310	68.58	149.85	256.65	
								3004
1334.00	1545.3	1532.8	2298	2311	68.41	149.50	256.08	
								2893
1336.00	1548.2	1535.7	2299	2312	68.26	149.18	255.56	
								2887
1338.00	1551.1	1538.6	2300	2313	68.11	148.86	255.05	
								2965
1340.00	1554.1	1541.6	2301	2314	67.94	148.52	254.50	
								2996
1342.00	1557.1	1544.6	2302	2315	67.78	148.18	253.95	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3106
1344.00	1560.2	1547.7	2303	2317	67.61	147.81	253.35	
								3002
1346.00	1563.2	1550.7	2304	2318	67.45	147.47	252.80	
								2986
1348.00	1566.2	1553.7	2305	2319	67.29	147.14	252.26	
								3059
1350.00	1569.2	1556.7	2306	2320	67.12	146.79	251.69	
								2909
1352.00	1572.1	1559.6	2307	2321	66.97	146.48	251.18	
								2942
1354.00	1575.1	1562.6	2308	2322	66.82	146.16	250.66	
								2998
1356.00	1578.1	1565.6	2309	2324	66.66	145.83	250.12	
								2856
1358.00	1580.9	1568.4	2310	2324	66.52	145.53	249.64	
								2917
1360.00	1583.8	1571.3	2311	2325	66.37	145.22	249.13	
								2920
1362.00	1586.8	1574.3	2312	2326	66.22	144.91	248.63	
								3078
1364.00	1589.8	1577.3	2313	2328	66.06	144.57	248.07	
								3051
1366.00	1592.9	1580.4	2314	2329	65.90	144.23	247.52	
								3008
1368.00	1595.9	1583.4	2315	2330	65.74	143.90	246.99	
								3152
1370.00	1599.1	1586.6	2316	2331	65.57	143.55	246.41	
								3204
1372.00	1602.3	1589.8	2317	2333	65.40	143.18	245.81	
								3111
1374.00	1605.4	1592.9	2319	2334	65.24	142.84	245.25	
								3000
1376.00	1608.4	1595.9	2320	2335	65.08	142.52	244.73	
								3174
1378.00	1611.5	1599.0	2321	2337	64.92	142.17	244.15	
								2965
1380.00	1614.5	1602.0	2322	2338	64.77	141.86	243.65	
								3108
1382.00	1617.6	1605.1	2323	2339	64.61	141.53	243.10	
								3115
1384.00	1620.7	1608.2	2324	2340	64.45	141.19	242.55	
								3080
1386.00	1623.8	1611.3	2325	2342	64.30	140.86	242.02	
								3236
1388.00	1627.0	1614.5	2326	2343	64.13	140.50	241.43	
								3170
1390.00	1630.2	1617.7	2328	2345	63.96	140.16	240.87	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3047
1392.00	1633.3	1620.8	2329	2346	63.81	139.85	240.35	
								3097
1394.00	1636.4	1623.9	2330	2347	63.66	139.52	239.82	
								3173
1396.00	1639.5	1627.0	2331	2348	63.50	139.18	239.26	
								3211
1398.00	1642.7	1630.2	2332	2350	63.33	138.84	238.70	
								3236
1400.00	1646.0	1633.5	2334	2351	63.17	138.49	238.12	
								3186
1402.00	1649.2	1636.7	2335	2353	63.01	138.15	237.57	
								3245
1404.00	1652.4	1639.9	2336	2354	62.84	137.80	237.00	
								3282
1406.00	1655.7	1643.2	2337	2356	62.68	137.45	236.42	
								3279
1408.00	1659.0	1646.5	2339	2357	62.51	137.09	235.84	
								3284
1410.00	1662.3	1649.8	2340	2359	62.34	136.74	235.26	
								3420
1412.00	1665.7	1653.2	2342	2361	62.16	136.36	234.63	
								3343
1414.00	1669.0	1656.5	2343	2363	61.99	136.00	234.04	
								3315
1416.00	1672.3	1659.8	2344	2364	61.83	135.65	233.46	
								3325
1418.00	1675.7	1663.2	2346	2366	61.66	135.30	232.88	
								3275
1420.00	1678.9	1666.4	2347	2367	61.50	134.95	232.32	
								3330
422.00	1682.3	1669.8	2348	2369	61.33	134.60	231.74	
								3405
1424.00	1685.7	1673.2	2350	2371	61.16	134.24	231.14	
								3401
1426.00	1689.1	1676.6	2351	2372	60.99	133.88	230.54	
								3339
1428.00	1692.4	1679.9	2353	2374	60.83	133.53	229.97	
								3301
1430.00	1695.7	1683.2	2354	2376	60.67	133.19	229.41	
								3259
1432.00	1699.0	1686.5	2355	2377	60.51	132.87	228.87	
								3189
1434.00	1702.2	1689.7	2357	2378	60.37	132.55	228.36	
								3287
1436.00	1705.4	1692.9	2358	2380	60.21	132.23	227.82	
								3220
1438.00	1708.7	1696.2	2359	2381	60.06	131.91	227.30	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3166
1440.00	1711.8	1699.3	2360	2383	59.92	131.61	226.80	
								3144
1442.00	1715.0	1702.5	2361	2384	59.78	131.31	226.31	
								3225
1444.00	1718.2	1705.7	2362	2385	59.63	131.00	225.80	
								3263
1446.00	1721.5	1709.0	2364	2387	59.48	130.68	225.28	
								3295
1448.00	1724.8	1712.3	2365	2388	59.33	130.36	224.74	
								3301
1450.00	1728.1	1715.6	2366	2390	59.18	130.04	224.21	
								3261
1452.00	1731.3	1718.8	2368	2391	59.03	129.73	223.70	
								3120
1454.00	1734.4	1721.9	2369	2392	58.90	129.44	223.23	
								3271
1456.00	1737.7	1725.2	2370	2394	58.75	129.13	222.72	
								3348
1458.00	1741.1	1728.6	2371	2395	58.60	128.81	222.18	
								3418
1460.00	1744.5	1732.0	2373	2397	58.44	128.47	221.62	
								3396
1462.00	1747.9	1735.4	2374	2399	58.28	128.14	221.07	
								3218
1464.00	1751.1	1738.6	2375	2400	58.15	127.84	220.58	
								3281
1466.00	1754.4	1741.9	2376	2401	58.00	127.54	220.08	
								3275
1468.00	1757.6	1745.1	2378	2403	57.86	127.24	219.58	
								3655
1470.00	1761.3	1748.8	2379	2405	57.68	126.86	218.95	
								3352
1472.00	1764.7	1752.2	2381	2406	57.53	126.54	218.43	
								3059
1474.00	1767.7	1755.2	2382	2407	57.41	126.28	218.00	
								3559
1476.00	1771.3	1758.8	2383	2409	57.25	125.93	217.42	
								3394
1478.00	1774.7	1762.2	2385	2411	57.10	125.61	216.89	
								3440
1480.00	1778.1	1765.6	2386	2413	56.95	125.29	216.35	
								3280
1482.00	1781.4	1768.9	2387	2414	56.81	125.00	215.87	
								3405
1484.00	1784.8	1772.3	2389	2416	56.66	124.68	215.34	
								3426
1486.00	1788.2	1775.7	2390	2417	56.51	124.36	214.82	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3438
1488.00	1791.7	1779.2	2391	2419	56.36	124.05	214.29	
								3515
1490.00	1795.2	1782.7	2393	2421	56.21	123.71	213.74	
								3438
1492.00	1798.6	1786.1	2394	2422	56.06	123.40	213.21	
								3652
1494.00	1802.3	1789.8	2396	2424	55.89	123.04	212.62	
								3210
1496.00	1805.5	1793.0	2397	2426	55.77	122.77	212.17	
								3347
1498.00	1808.8	1796.3	2398	2427	55.63	122.48	211.69	
								3379
1500.00	1812.2	1799.7	2400	2429	55.49	122.18	211.19	
								3238
1502.00	1815.4	1802.9	2401	2430	55.36	121.91	210.74	
								3384
1504.00	1818.8	1806.3	2402	2431	55.22	121.61	210.25	
								3250
1506.00	1822.1	1809.6	2403	2433	55.09	121.34	209.80	
								3396
1508.00	1825.5	1813.0	2404	2434	54.96	121.05	209.31	
								3280
1510.00	1828.7	1816.2	2406	2436	54.83	120.77	208.85	
								3348
1512.00	1832.1	1819.6	2407	2437	54.69	120.49	208.38	
								3347
1514.00	1835.4	1822.9	2408	2438	54.56	120.21	207.91	
								3306
1516.00	1838.7	1826.2	2409	2440	54.43	119.93	207.45	
								3339
.518.00	1842.1	1829.6	2411	2441	54.30	119.65	206.99	
								3306
1520.00	1845.4	1832.9	2412	2442	54.18	119.38	206.53	
								3294
1522.00	1848.7	1836.2	2413	2444	54.05	119.11	206.08	
								3163
1524.00	1851.9	1839.3	2414	2445	53.93	118.86	205.67	
								3229
1526.00	1855.1	1842.6	2415	2446	53.81	118.61	205.25	
								3439
1528.00	1858.5	1846.0	2416	2448	53.68	118.32	204.77	
								3424
1530.00	1861.9	1849.4	2418	2449	53.55	118.03	204.29	
								3564
1532.00	1865.5	1853.0	2419	2451	53.40	117.72	203.77	
								3479
1534.00	1869.0	1856.5	2420	2453	53.26	117.43	203.29	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3331
1536.00	1872.3	1859.8	2422	2454	53.14	117.16	202.84	
								3365
1538.00	1875.7	1863.2	2423	2455	53.01	116.89	202.39	
								3284
1540.00	1879.0	1866.5	2424	2457	52.89	116.64	201.96	
								3398
1542.00	1882.4	1869.9	2425	2458	52.77	116.36	201.51	
								3281
1544.00	1885.6	1873.1	2426	2459	52.65	116.11	201.08	
								3314
1546.00	1889.0	1876.5	2427	2461	52.53	115.85	200.65	
								3421
1548.00	1892.4	1879.9	2429	2462	52.40	115.58	200.20	
								3423
1550.00	1895.8	1883.3	2430	2464	52.27	115.31	199.74	
								3404
1552.00	1899.2	1886.7	2431	2465	52.15	115.04	199.29	
								3322
1554.00	1902.5	1890.0	2432	2466	52.03	114.78	198.87	
								3348
1556.00	1905.9	1893.4	2434	2468	51.91	114.53	198.44	
								3425
1558.00	1909.3	1896.8	2435	2469	51.78	114.26	197.99	
								3424
1560.00	1912.7	1900.2	2436	2471	51.66	113.99	197.55	
								3447
1562.00	1916.2	1903.7	2437	2472	51.53	113.72	197.10	
								3362
1564.00	1919.5	1907.0	2439	2473	51.41	113.47	196.67	
								3374
566.00	1922.9	1910.4	2440	2475	51.29	113.21	196.24	
								3268
1568.00	1926.2	1913.7	2441	2476	51.18	112.97	195.85	
								3409
1570.00	1929.6	1917.1	2442	2477	51.06	112.71	195.41	
								3628
1572.00	1933.2	1920.7	2444	2479	50.93	112.42	194.92	
								3544
1574.00	1936.8	1924.3	2445	2481	50.80	112.15	194.46	
								3431
1576.00	1940.2	1927.7	2446	2482	50.68	111.89	194.03	
								3635
1578.00	1943.8	1931.3	2448	2484	50.54	111.60	193.54	
								3522
1580.00	1947.3	1934.8	2449	2486	50.42	111.33	193.09	
								3681
1582.00	1951.0	1938.5	2451	2487	50.28	111.04	192.60	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
1584.00	1954.6	1942.1	2452	2489	50.16	110.77	192.15	3541
1586.00	1958.2	1945.7	2454	2491	50.02	110.47	191.66	3681
1588.00	1961.6	1949.1	2455	2492	49.91	110.23	191.25	3378
1590.00	1965.1	1952.6	2456	2494	49.79	109.98	190.83	3442
1592.00	1968.5	1956.0	2457	2495	49.67	109.73	190.41	3458
1594.00	1972.0	1959.5	2459	2497	49.55	109.47	189.98	3505
1596.00	1975.6	1963.1	2460	2498	49.43	109.21	189.53	3556
1598.00	1979.2	1966.7	2461	2500	49.31	108.94	189.09	3569
1600.00	1982.6	1970.1	2463	2501	49.19	108.69	188.67	3464
1602.00	1986.4	1973.9	2464	2503	49.06	108.40	188.18	3765
1604.00	1989.9	1977.4	2466	2505	48.94	108.14	187.74	3544
1606.00	1993.5	1981.0	2467	2506	48.81	107.88	187.30	3584
1608.00	1997.2	1984.7	2469	2508	48.69	107.61	186.84	3666
1610.00	2001.0	1988.5	2470	2510	48.55	107.31	186.35	3816
1612.00	2004.7	1992.2	2472	2512	48.42	107.03	185.88	3727
.614.00	2008.4	1995.9	2473	2514	48.30	106.76	185.43	3656
1616.00	2012.1	1999.6	2475	2516	48.17	106.49	184.97	3708
1618.00	2015.7	2003.2	2476	2517	48.05	106.24	184.54	3571
1620.00	2019.2	2006.7	2477	2519	47.94	105.98	184.11	3583
1622.00	2022.4	2009.9	2478	2520	47.84	105.78	183.78	3190
1624.00	2026.2	2013.7	2480	2522	47.72	105.51	183.32	3726
1626.00	2029.9	2017.4	2481	2524	47.59	105.24	182.86	3754
1628.00	2034.0	2021.5	2483	2526	47.44	104.92	182.32	4068
1630.00	2037.8	2025.3	2485	2528	47.31	104.64	181.86	3777

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								3880
1632.00	2041.6	2029.1	2487	2530	47.18	104.35	181.37	
								3559
1634.00	2045.2	2032.7	2488	2532	47.07	104.11	180.96	
								3374
1636.00	2048.6	2036.1	2489	2533	46.97	103.90	180.60	
								3693
1638.00	2052.3	2039.8	2491	2535	46.85	103.64	180.17	
								4010
1640.00	2056.3	2043.8	2492	2537	46.71	103.34	179.66	
								3981
1642.00	2060.3	2047.8	2494	2539	46.57	103.04	179.16	
								4058
1644.00	2064.3	2051.8	2496	2541	46.43	102.73	178.64	
								3891
1646.00	2068.2	2055.7	2498	2544	46.30	102.45	178.16	
								3930
1648.00	2072.1	2059.6	2500	2546	46.17	102.17	177.69	
								3594
1650.00	2075.7	2063.2	2501	2547	46.06	101.93	177.29	
								3769
1652.00	2079.5	2067.0	2502	2549	45.94	101.67	176.85	
								3717
1654.00	2083.2	2070.7	2504	2551	45.83	101.43	176.43	
								3766
1656.00	2087.0	2074.5	2505	2553	45.71	101.17	176.00	
								3938
1658.00	2090.9	2078.4	2507	2555	45.58	100.89	175.53	
								3834
1660.00	2094.7	2082.2	2509	2557	45.46	100.63	175.09	
								3797
662.00	2098.5	2086.0	2510	2559	45.34	100.37	174.65	
								3854
1664.00	2102.4	2089.9	2512	2560	45.22	100.11	174.21	
								3932
1666.00	2106.3	2093.8	2514	2563	45.09	99.84	173.75	
								4062
1668.00	2110.4	2097.9	2515	2565	44.96	99.55	173.26	
								4051
1670.00	2114.4	2101.9	2517	2567	44.83	99.27	172.78	
								3997
1672.00	2118.4	2105.9	2519	2569	44.70	98.99	172.31	
								3992
1674.00	2122.4	2109.9	2521	2572	44.57	98.72	171.85	
								3819
1676.00	2126.3	2113.8	2522	2573	44.46	98.47	171.43	
								4088
1678.00	2130.3	2117.8	2524	2576	44.33	98.18	170.95	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								4050
1680.00	2134.4	2121.9	2526	2578	44.20	97.91	170.48	
								3845
1682.00	2138.2	2125.7	2528	2580	44.09	97.66	170.06	
								4148
1684.00	2142.4	2129.9	2530	2582	43.95	97.37	169.57	
								4158
1686.00	2146.5	2134.0	2531	2585	43.82	97.08	169.08	
								4038
1688.00	2150.6	2138.1	2533	2587	43.70	96.81	168.62	
								3728
1690.00	2154.3	2141.8	2535	2589	43.59	96.58	168.24	
								3870
1692.00	2158.2	2145.7	2536	2590	43.48	96.34	167.82	
								5080
1694.00	2163.3	2150.8	2539	2595	43.28	95.92	167.11	
								5769
1696.00	2169.0	2156.5	2543	2601	43.04	95.38	166.19	
								4678
1698.00	2173.7	2161.2	2546	2604	42.88	95.03	165.59	
								4788
1700.00	2178.5	2166.0	2548	2608	42.71	94.67	164.98	
								4416
1702.00	2182.9	2170.4	2550	2611	42.57	94.36	164.45	
								4362
1704.00	2187.3	2174.8	2553	2614	42.43	94.06	163.95	
								3974
1706.00	2191.2	2178.7	2554	2616	42.32	93.82	163.53	
								4353
1708.00	2195.6	2183.1	2556	2618	42.18	93.52	163.03	
								4497
1710.00	2200.1	2187.6	2559	2621	42.04	93.21	162.51	
								4652
1712.00	2204.7	2192.2	2561	2625	41.89	92.88	161.94	
								4476
1714.00	2209.2	2196.7	2563	2627	41.75	92.58	161.43	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2250
192.00	198.6	186.1	1939	1971	350.48	592.90	840.74	
								2250
194.00	200.9	188.4	1942	1974	348.45	590.24	837.56	
								2250
196.00	203.1	190.6	1945	1977	346.45	587.62	834.42	
								2250
198.00	205.4	192.9	1948	1980	344.48	585.03	831.33	
								2251
200.00	207.6	195.1	1951	1983	342.53	582.47	828.27	
								2251
202.00	209.9	197.4	1954	1986	340.60	579.94	825.25	
								2251
204.00	212.1	199.6	1957	1988	338.70	577.44	822.27	
								2251
206.00	214.4	201.9	1960	1991	336.82	574.97	819.33	
								2252
208.00	216.6	204.1	1963	1994	334.96	572.53	816.41	
								2252
210.00	218.9	206.4	1966	1996	333.12	570.12	813.54	
								2252
212.00	221.2	208.7	1968	1999	331.31	567.73	810.69	
								2252
214.00	223.4	210.9	1971	2002	329.51	565.37	807.88	
								2252
216.00	225.7	213.2	1974	2004	327.74	563.04	805.10	
								2253
218.00	227.9	215.4	1976	2006	325.99	560.73	802.35	
								2253
220.00	230.2	217.7	1979	2009	324.25	558.44	799.62	
								2253
222.00	232.4	219.9	1981	2011	322.53	556.18	796.93	
								2253
224.00	234.7	222.2	1984	2013	320.84	553.94	794.26	
								2254
226.00	236.9	224.4	1986	2016	319.16	551.72	791.62	
								2254
228.00	239.2	226.7	1988	2018	317.50	549.52	789.01	
								2254
230.00	241.4	228.9	1991	2020	315.85	547.35	786.42	
								2254
232.00	243.7	231.2	1993	2022	314.22	545.19	783.86	
								2255
234.00	245.9	233.4	1995	2024	312.61	543.06	781.32	
								2255
236.00	248.2	235.7	1997	2026	311.02	540.94	778.80	
								2255
238.00	250.5	238.0	2000	2028	309.44	538.85	776.31	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2255
240.00	252.7	240.2	2002	2030	307.87	536.77	773.84	
								2256
242.00	255.0	242.5	2004	2032	306.33	534.71	771.39	
								2256
244.00	257.2	244.7	2006	2034	304.79	532.67	768.96	
								2256
246.00	259.5	247.0	2008	2036	303.28	530.65	766.56	
								2256
248.00	261.7	249.2	2010	2038	301.77	528.65	764.17	
								2257
250.00	264.0	251.5	2012	2040	300.28	526.66	761.80	
								2257
252.00	266.2	253.7	2014	2042	298.81	524.69	759.46	
								2257
254.00	268.5	256.0	2016	2044	297.35	522.73	757.13	
								2257
256.00	270.8	258.3	2018	2045	295.90	520.79	754.82	
								2258
258.00	273.0	260.5	2019	2047	294.46	518.87	752.53	
								2258
260.00	275.3	262.8	2021	2049	293.04	516.96	750.26	
								2258
262.00	277.5	265.0	2023	2050	291.63	515.07	748.00	
								2258
264.00	279.8	267.3	2025	2052	290.24	513.19	745.76	
								2259
266.00	282.0	269.5	2027	2054	288.85	511.33	743.54	
								2259
268.00	284.3	271.8	2028	2055	287.48	509.48	741.34	
								2259
270.00	286.6	274.1	2030	2057	286.12	507.64	739.15	
								2259
272.00	288.8	276.3	2032	2058	284.77	505.82	736.97	
								2259
274.00	291.1	278.6	2033	2060	283.44	504.02	734.82	
								2260
276.00	293.3	280.8	2035	2061	282.11	502.22	732.67	
								2260
278.00	295.6	283.1	2037	2063	280.80	500.44	730.55	
								2260
280.00	297.9	285.4	2038	2064	279.50	498.67	728.43	
								2260
282.00	300.1	287.6	2040	2066	278.20	496.92	726.34	
								2261
284.00	302.4	289.9	2041	2067	276.92	495.17	724.25	
								2261
286.00	304.6	292.1	2043	2069	275.65	493.44	722.18	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1 PAGE

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2261
288.00	306.9	294.4	2044	2070	274.39	491.72	720.13	
								2261
290.00	309.2	296.7	2046	2072	273.15	490.01	718.08	
								2262
292.00	311.4	298.9	2047	2073	271.91	488.32	716.05	
								2262
294.00	313.7	301.2	2049	2074	270.68	486.64	714.04	
								2262
296.00	316.0	303.5	2050	2076	269.46	484.96	712.03	
								2262
298.00	318.2	305.7	2052	2077	268.25	483.30	710.04	
								2263
300.00	320.5	308.0	2053	2078	267.05	481.65	708.06	
								2263
302.00	322.7	310.2	2055	2079	265.86	480.01	706.09	
								2263
304.00	325.0	312.5	2056	2081	264.68	478.38	704.14	
								2263
306.00	327.3	314.8	2057	2082	263.51	476.77	702.20	
								2264
308.00	329.5	317.0	2059	2083	262.35	475.16	700.26	
								2264
310.00	331.8	319.3	2060	2084	261.20	473.56	698.34	
								2264
312.00	334.1	321.6	2061	2086	260.05	471.98	696.44	
								2264
314.00	336.3	323.8	2063	2087	258.92	470.40	694.54	
								2265
316.00	338.6	326.1	2064	2088	257.79	468.83	692.65	
								2265
318.00	340.9	328.4	2065	2089	256.67	467.27	690.77	
								2265
320.00	343.1	330.6	2066	2090	255.56	465.73	688.91	
								2265
322.00	345.4	332.9	2068	2091	254.46	464.19	687.05	
								2266
324.00	347.7	335.2	2069	2093	253.37	462.66	685.21	
								2266
326.00	349.9	337.4	2070	2094	252.29	461.14	683.38	
								2266
328.00	352.2	339.7	2071	2095	251.21	459.63	681.55	
								2266
330.00	354.4	341.9	2072	2096	250.14	458.13	679.74	
								2267
332.00	356.7	344.2	2074	2097	249.08	456.64	677.93	
								2267
334.00	359.0	346.5	2075	2098	248.03	455.16	676.14	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2267
336.00	361.2	348.7	2076	2099	246.99	453.68	674.35	
								2267
338.00	363.5	351.0	2077	2100	245.95	452.22	672.58	
								2268
340.00	365.8	353.3	2078	2101	244.92	450.76	670.81	
								2268
342.00	368.1	355.6	2079	2102	243.90	449.31	669.05	
								2268
344.00	370.3	357.8	2080	2103	242.89	447.87	667.30	
								2268
346.00	372.6	360.1	2081	2104	241.88	446.44	665.56	
								2269
348.00	374.9	362.4	2083	2105	240.88	445.02	663.83	
								2269
350.00	377.1	364.6	2084	2106	239.89	443.60	662.11	
								2269
352.00	379.4	366.9	2085	2107	238.90	442.19	660.40	
								2269
354.00	381.7	369.2	2086	2108	237.92	440.79	658.69	
								2269
356.00	383.9	371.4	2087	2109	236.95	439.40	657.00	
								2270
358.00	386.2	373.7	2088	2110	235.99	438.02	655.31	
								2270
360.00	388.5	376.0	2089	2111	235.03	436.64	653.63	
								2270
362.00	390.7	378.2	2090	2112	234.08	435.27	651.96	
								2270
364.00	393.0	380.5	2091	2113	233.14	433.91	650.30	
								2271
366.00	395.3	382.8	2092	2113	232.20	432.56	648.64	
								2271
368.00	397.6	385.1	2093	2114	231.27	431.21	646.99	
								2271
370.00	399.8	387.3	2094	2115	230.34	429.88	645.36	
								2271
372.00	402.1	389.6	2095	2116	229.42	428.54	643.72	
								2272
374.00	404.4	391.9	2096	2117	228.51	427.22	642.10	
								2272
376.00	406.6	394.1	2096	2118	227.61	425.90	640.48	
								2272
378.00	408.9	396.4	2097	2119	226.71	424.59	638.87	
								2272
380.00	411.2	398.7	2098	2119	225.81	423.29	637.27	
								2273
382.00	413.5	401.0	2099	2120	224.93	421.99	635.68	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2273
384.00	415.7	403.2	2100	2121	224.05	420.70	634.09	
								2273
386.00	418.0	405.5	2101	2122	223.17	419.42	632.51	
								2273
388.00	420.3	407.8	2102	2123	222.30	418.15	630.94	
								2274
390.00	422.6	410.1	2103	2124	221.44	416.88	629.38	
								2274
392.00	424.8	412.3	2104	2124	220.58	415.62	627.82	
								2274
394.00	427.1	414.6	2105	2125	219.73	414.36	626.27	
								2274
396.00	429.4	416.9	2105	2126	218.88	413.11	624.72	
								2275
398.00	431.6	419.1	2106	2127	218.04	411.87	623.18	
								2275
400.00	433.9	421.4	2107	2127	217.21	410.63	621.65	
								2275
402.00	436.2	423.7	2108	2128	216.38	409.40	620.13	
								2275
404.00	438.5	426.0	2109	2129	215.55	408.18	618.61	
								2276
406.00	440.7	428.2	2110	2130	214.73	406.96	617.10	
								2276
408.00	443.0	430.5	2110	2130	213.92	405.75	615.60	
								2276
410.00	445.3	432.8	2111	2131	213.11	404.54	614.10	
								2276
412.00	447.6	435.1	2112	2132	212.31	403.34	612.61	
								2277
414.00	449.9	437.4	2113	2133	211.51	402.15	611.12	
								2277
416.00	452.1	439.6	2114	2133	210.72	400.96	609.64	
								2277
418.00	454.4	441.9	2114	2134	209.93	399.78	608.17	
								2277
420.00	456.7	444.2	2115	2135	209.15	398.61	606.71	
								2278
422.00	459.0	446.5	2116	2135	208.37	397.44	605.25	
								2278
424.00	461.2	448.7	2117	2136	207.60	396.28	603.79	
								2278
426.00	463.5	451.0	2117	2137	206.83	395.12	602.34	
								2278
428.00	465.8	453.3	2118	2138	206.07	393.97	600.90	
								2279
430.00	468.1	455.6	2119	2138	205.31	392.82	599.47	

570251

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2279
432.00	470.4	457.9	2120	2139	204.56	391.68	598.04	
								2279
434.00	472.6	460.1	2120	2140	203.81	390.54	596.61	
								2279
436.00	474.9	462.4	2121	2140	203.07	389.41	595.19	
								2280
438.00	477.2	464.7	2122	2141	202.33	388.29	593.78	
								2280
440.00	479.5	467.0	2123	2142	201.60	387.17	592.37	
								2280
442.00	481.8	469.3	2123	2142	200.87	386.06	590.97	
								2280
444.00	484.0	471.5	2124	2143	200.14	384.95	589.58	
								2281
446.00	486.3	473.8	2125	2143	199.42	383.85	588.19	
								2281
448.00	488.6	476.1	2125	2144	198.71	382.75	586.80	
								2281
450.00	490.9	478.4	2126	2145	198.00	381.66	585.42	
								2281
452.00	493.2	480.7	2127	2145	197.29	380.57	584.05	
								2282
454.00	495.4	482.9	2127	2146	196.59	379.49	582.68	
								2282
456.00	497.7	485.2	2128	2147	195.89	378.41	581.32	
								2282
458.00	500.0	487.5	2129	2147	195.20	377.34	579.96	
								2282
460.00	502.3	489.8	2130	2148	194.51	376.27	578.61	
								2283
462.00	504.6	492.1	2130	2148	193.82	375.21	577.27	
								2283
464.00	506.9	494.4	2131	2149	193.14	374.16	575.92	
								2283
466.00	509.1	496.6	2131	2150	192.46	373.10	574.59	
								2283
468.00	511.4	498.9	2132	2150	191.79	372.06	573.26	
								2284
470.00	513.7	501.2	2133	2151	191.12	371.02	571.93	
								2284
472.00	516.0	503.5	2133	2151	190.46	369.98	570.61	
								2284
474.00	518.3	505.8	2134	2152	189.80	368.95	569.30	
								2284
476.00	520.6	508.1	2135	2152	189.14	367.92	567.99	
								2285
478.00	522.8	510.3	2135	2153	188.49	366.90	566.68	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2285
480.00	525.1	512.6	2136	2154	187.84	365.88	565.38	
								2285
482.00	527.4	514.9	2137	2154	187.19	364.87	564.09	
								2285
484.00	529.7	517.2	2137	2155	186.55	363.86	562.80	
								2286
486.00	532.0	519.5	2138	2155	185.91	362.85	561.51	
								2286
488.00	534.3	521.8	2138	2156	185.28	361.86	560.23	
								2286
490.00	536.6	524.1	2139	2156	184.65	360.86	558.95	
								2286
492.00	538.8	526.3	2140	2157	184.02	359.87	557.68	
								2287
494.00	541.1	528.6	2140	2157	183.40	358.89	556.42	
								2287
496.00	543.4	530.9	2141	2158	182.78	357.91	555.16	
								2287
498.00	545.7	533.2	2141	2159	182.17	356.93	553.90	
								2287
500.00	548.0	535.5	2142	2159	181.55	355.96	552.65	
								2288
502.00	550.3	537.8	2143	2160	180.95	354.99	551.40	
								2288
504.00	552.6	540.1	2143	2160	180.34	354.03	550.16	
								2288
506.00	554.8	542.3	2144	2161	179.74	353.07	548.92	
								2288
508.00	557.1	544.6	2144	2161	179.14	352.11	547.68	
								2289
510.00	559.4	546.9	2145	2162	178.55	351.16	546.46	
								2289
512.00	561.7	549.2	2145	2162	177.96	350.22	545.23	
								2289
514.00	564.0	551.5	2146	2163	177.37	349.27	544.01	
								2289
516.00	566.3	553.8	2146	2163	176.79	348.34	542.80	
								2290
518.00	568.6	556.1	2147	2164	176.21	347.40	541.58	
								2290
520.00	570.9	558.4	2148	2164	175.63	346.47	540.38	
								2290
522.00	573.2	560.7	2148	2165	175.06	345.55	539.18	
								2290
524.00	575.5	563.0	2149	2165	174.48	344.63	537.98	
								2291
526.00	577.7	565.2	2149	2166	173.92	343.71	536.78	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2291
528.00	580.0	567.5	2150	2166	173.35	342.80	535.59	
								2291
530.00	582.3	569.8	2150	2167	172.79	341.89	534.41	
								2291
532.00	584.6	572.1	2151	2167	172.23	340.98	533.23	
								2292
534.00	586.9	574.4	2151	2168	171.68	340.08	532.05	
								2292
536.00	589.2	576.7	2152	2168	171.13	339.18	530.88	
								2292
538.00	591.5	579.0	2152	2169	170.58	338.29	529.71	
								2292
540.00	593.8	581.3	2153	2169	170.03	337.40	528.55	
								2293
542.00	596.1	583.6	2153	2170	169.49	336.52	527.39	
								2293
544.00	598.4	585.9	2154	2170	168.95	335.64	526.23	
								2293
546.00	600.7	588.2	2154	2170	168.42	334.76	525.08	
								2293
548.00	603.0	590.5	2155	2171	167.88	333.88	523.93	
								2294
550.00	605.3	592.8	2155	2171	167.35	333.01	522.79	
								2294
552.00	607.5	595.0	2156	2172	166.83	332.15	521.65	
								2294
554.00	609.8	597.3	2156	2172	166.30	331.28	520.52	
								2294
556.00	612.1	599.6	2157	2173	165.78	330.43	519.38	
								2295
558.00	614.4	601.9	2157	2173	165.26	329.57	518.26	
								2295
560.00	616.7	604.2	2158	2174	164.74	328.72	517.13	
								2295
562.00	619.0	606.5	2158	2174	164.23	327.87	516.01	
								2295
564.00	621.3	608.8	2159	2175	163.72	327.03	514.90	
								2296
566.00	623.6	611.1	2159	2175	163.21	326.19	513.79	
								2296
568.00	625.9	613.4	2160	2175	162.71	325.35	512.68	
								2296
570.00	628.2	615.7	2160	2176	162.21	324.52	511.58	
								2297
572.00	630.5	618.0	2161	2176	161.71	323.69	510.47	
								2297
574.00	632.8	620.3	2161	2177	161.21	322.86	509.38	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2297
576.00	635.1	622.6	2162	2177	160.72	322.04	508.29	
								2297
578.00	637.4	624.9	2162	2178	160.23	321.22	507.20	
								2297
580.00	639.7	627.2	2163	2178	159.74	320.40	506.11	
								2298
582.00	642.0	629.5	2163	2178	159.25	319.59	505.03	
								2298
584.00	644.3	631.8	2164	2179	158.77	318.78	503.95	
								2298
586.00	646.6	634.1	2164	2179	158.29	317.97	502.88	
								2299
588.00	648.9	636.4	2165	2180	157.81	317.17	501.81	
								2299
590.00	651.2	638.7	2165	2180	157.33	316.37	500.74	
								2299
592.00	653.5	641.0	2165	2180	156.86	315.58	499.68	
								2299
594.00	655.8	643.3	2166	2181	156.39	314.79	498.62	
								2300
596.00	658.1	645.6	2166	2181	155.92	314.00	497.57	
								2300
598.00	660.4	647.9	2167	2182	155.45	313.21	496.51	
								2300
600.00	662.7	650.2	2167	2182	154.99	312.43	495.47	
								2300
602.00	665.0	652.5	2168	2183	154.53	311.65	494.42	
								2301
604.00	667.3	654.8	2168	2183	154.07	310.87	493.38	
								2301
606.00	669.6	657.1	2169	2183	153.62	310.10	492.34	
								2301
608.00	671.9	659.4	2169	2184	153.16	309.33	491.31	
								2301
610.00	674.2	661.7	2169	2184	152.71	308.56	490.28	
								2302
612.00	676.5	664.0	2170	2185	152.26	307.80	489.25	
								2302
614.00	678.8	666.3	2170	2185	151.81	307.04	488.23	
								2302
616.00	681.1	668.6	2171	2185	151.37	306.28	487.20	
								2302
618.00	683.4	670.9	2171	2186	150.93	305.53	486.19	
								2303
620.00	685.7	673.2	2172	2186	150.49	304.78	485.17	
								2303
622.00	688.0	675.5	2172	2186	150.05	304.03	484.16	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2303
624.00	690.3	677.8	2172	2187	149.62	303.29	483.16	
								2303
626.00	692.6	680.1	2173	2187	149.18	302.55	482.15	
								2304
628.00	694.9	682.4	2173	2188	148.75	301.81	481.15	
								2304
630.00	697.2	684.7	2174	2188	148.32	301.07	480.16	
								2304
632.00	699.5	687.0	2174	2188	147.90	300.34	479.16	
								2304
634.00	701.8	689.3	2175	2189	147.47	299.61	478.17	
								2305
636.00	704.1	691.6	2175	2189	147.05	298.88	477.19	
								2305
638.00	706.4	693.9	2175	2189	146.63	298.16	476.20	
								2305
640.00	708.7	696.2	2176	2190	146.21	297.44	475.22	
								2305
642.00	711.0	698.5	2176	2190	145.80	296.72	474.25	
								2306
644.00	713.3	700.8	2177	2191	145.38	296.01	473.27	
								2306
646.00	715.6	703.1	2177	2191	144.97	295.30	472.30	
								2306
648.00	718.0	705.5	2177	2191	144.56	294.59	471.33	
								2306
650.00	720.3	707.8	2178	2192	144.15	293.88	470.37	
								2307
652.00	722.6	710.1	2178	2192	143.75	293.18	469.41	
								2307
654.00	724.9	712.4	2179	2192	143.35	292.48	468.45	
								2307
656.00	727.2	714.7	2179	2193	142.94	291.78	467.50	
								2308
658.00	729.5	717.0	2179	2193	142.55	291.08	466.54	
								2308
660.00	731.8	719.3	2180	2193	142.15	290.39	465.59	
								2308
662.00	734.1	721.6	2180	2194	141.75	289.70	464.65	
								2308
664.00	736.4	723.9	2180	2194	141.36	289.01	463.71	
								2309
666.00	738.7	726.2	2181	2195	140.97	288.33	462.77	
								2309
668.00	741.0	728.5	2181	2195	140.58	287.65	461.83	
								2309
670.00	743.3	730.8	2182	2195	140.19	286.97	460.90	

570256

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2309
672.00	745.7	733.2	2182	2196	139.80	286.29	459.97	
								2310
674.00	748.0	735.5	2182	2196	139.42	285.62	459.04	
								2310
676.00	750.3	737.8	2183	2196	139.04	284.95	458.12	
								2310
678.00	752.6	740.1	2183	2197	138.66	284.28	457.19	
								2310
680.00	754.9	742.4	2184	2197	138.28	283.62	456.28	
								2311
682.00	757.2	744.7	2184	2197	137.90	282.95	455.36	
								2311
684.00	759.5	747.0	2184	2198	137.53	282.29	454.45	
								2311
686.00	761.8	749.3	2185	2198	137.16	281.64	453.54	
								2311
688.00	764.1	751.6	2185	2198	136.78	280.98	452.63	
								2312
690.00	766.4	753.9	2185	2199	136.41	280.33	451.73	
								2312
692.00	768.8	756.3	2186	2199	136.05	279.68	450.83	
								2312
694.00	771.1	758.6	2186	2199	135.68	279.03	449.93	
								2312
696.00	773.4	760.9	2186	2200	135.32	278.39	449.04	
								2313
698.00	775.7	763.2	2187	2200	134.96	277.74	448.14	
								2313
700.00	778.0	765.5	2187	2200	134.59	277.10	447.25	
								2313
702.00	780.3	767.8	2188	2201	134.24	276.47	446.37	
								2313
704.00	782.6	770.1	2188	2201	133.88	275.83	445.48	
								2314
706.00	784.9	772.4	2188	2201	133.52	275.20	444.60	
								2314
708.00	787.3	774.8	2189	2202	133.17	274.57	443.73	
								2314
710.00	789.6	777.1	2189	2202	132.82	273.94	442.85	
								2315
712.00	791.9	779.4	2189	2202	132.47	273.32	441.98	
								2315
714.00	794.2	781.7	2190	2203	132.12	272.69	441.11	
								2315
716.00	796.5	784.0	2190	2203	131.77	272.07	440.24	
								2315
718.00	798.8	786.3	2190	2203	131.43	271.46	439.38	

COMPANY : PREMIER OIL WELL : WHITE IBIS-1

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2316
720.00	801.2	788.7	2191	2204	131.08	270.84	438.52	
								2316
722.00	803.5	791.0	2191	2204	130.74	270.23	437.66	
								2316
724.00	805.8	793.3	2191	2204	130.40	269.62	436.80	
								2316
726.00	808.1	795.6	2192	2205	130.06	269.01	435.95	
								2317
728.00	810.4	797.9	2192	2205	129.72	268.40	435.10	
								2317
730.00	812.7	800.2	2192	2205	129.39	267.80	434.25	
								2317
732.00	815.1	802.6	2193	2205	129.05	267.20	433.40	
								2317
734.00	817.4	804.9	2193	2206	128.72	266.60	432.56	
								2318
736.00	819.7	807.2	2193	2206	128.39	266.00	431.72	
								2318
738.00	822.0	809.5	2194	2206	128.06	265.40	430.88	
								2318
740.00	824.3	811.8	2194	2207	127.73	264.81	430.05	
								2318
742.00	826.6	814.1	2194	2207	127.40	264.22	429.22	
								2319
744.00	829.0	816.5	2195	2207	127.08	263.63	428.39	
								2319
746.00	831.3	818.8	2195	2208	126.75	263.05	427.56	
								2319
748.00	833.6	821.1	2195	2208	126.43	262.46	426.74	
								2319
750.00	835.9	823.4	2196	2208	126.11	261.88	425.91	
								2320
752.00	838.2	825.7	2196	2209	125.79	261.30	425.10	
								2320
754.00	840.6	828.1	2196	2209	125.47	260.73	424.28	
								2320
756.00	842.9	830.4	2197	2209	125.16	260.15	423.46	
								2321
758.00	845.2	832.7	2197	2209	124.84	259.58	422.65	
								2321
760.00	847.5	835.0	2197	2210	124.53	259.01	421.84	
								2321
762.00	849.8	837.3	2198	2210	124.21	258.44	421.04	
								2321
764.00	852.2	839.7	2198	2210	123.90	257.87	420.23	
								2322
766.00	854.5	842.0	2198	2211	123.59	257.31	419.43	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2322
768.00	856.8	844.3	2199	2211	123.29	256.74	418.63	
								2322
770.00	859.1	846.6	2199	2211	122.98	256.18	417.83	
								2322
772.00	861.4	848.9	2199	2212	122.67	255.63	417.04	
								2323
774.00	863.8	851.3	2200	2212	122.37	255.07	416.25	
								2323
776.00	866.1	853.6	2200	2212	122.07	254.52	415.46	
								2323
778.00	868.4	855.9	2200	2212	121.77	253.96	414.67	
								2323
780.00	870.7	858.2	2201	2213	121.47	253.41	413.89	
								2324
782.00	873.1	860.6	2201	2213	121.17	252.87	413.11	
								2324
784.00	875.4	862.9	2201	2213	120.87	252.32	412.33	
								2324
786.00	877.7	865.2	2202	2214	120.57	251.78	411.55	
								2324
788.00	880.0	867.5	2202	2214	120.28	251.23	410.77	
								2325
790.00	882.4	869.9	2202	2214	119.99	250.69	410.00	
								2325
792.00	884.7	872.2	2202	2214	119.69	250.16	409.23	
								2325
794.00	887.0	874.5	2203	2215	119.40	249.62	408.46	
								2326
796.00	889.3	876.8	2203	2215	119.11	249.09	407.70	
								2326
798.00	891.7	879.2	2203	2215	118.83	248.55	406.93	
								2326
800.00	894.0	881.5	2204	2216	118.54	248.02	406.17	
								2326
802.00	896.3	883.8	2204	2216	118.25	247.50	405.41	
								2327
804.00	898.6	886.1	2204	2216	117.97	246.97	404.66	
								2327
806.00	901.0	888.5	2205	2216	117.68	246.44	403.90	
								2327
808.00	903.3	890.8	2205	2217	117.40	245.92	403.15	
								2327
810.00	905.6	893.1	2205	2217	117.12	245.40	402.40	
								2328
812.00	908.0	895.5	2206	2217	116.84	244.88	401.65	
								2328
814.00	910.3	897.8	2206	2218	116.56	244.37	400.91	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2328
816.00	912.6	900.1	2206	2218	116.29	243.85	400.17	
								2328
818.00	914.9	902.4	2206	2218	116.01	243.34	399.42	
								2329
820.00	917.3	904.8	2207	2218	115.73	242.83	398.69	
								2329
822.00	919.6	907.1	2207	2219	115.46	242.32	397.95	
								2329
824.00	921.9	909.4	2207	2219	115.19	241.81	397.22	
								2330
826.00	924.3	911.8	2208	2219	114.92	241.30	396.48	
								2330
828.00	926.6	914.1	2208	2219	114.65	240.80	395.75	
								2330
830.00	928.9	916.4	2208	2220	114.38	240.30	395.03	
								2330
832.00	931.2	918.7	2209	2220	114.11	239.80	394.30	
								2330
834.00	933.6	921.1	2209	2220	113.84	239.30	393.58	
								2331
836.00	935.9	923.4	2209	2221	113.58	238.80	392.86	
								2331
838.00	938.2	925.7	2209	2221	113.31	238.30	392.14	
								2331
840.00	940.6	928.1	2210	2221	113.05	237.81	391.42	
								2332
842.00	942.9	930.4	2210	2221	112.79	237.32	390.71	
								2332
844.00	945.2	932.7	2210	2222	112.52	236.83	390.00	
								2332
846.00	947.6	935.1	2211	2222	112.26	236.34	389.29	
								2332
848.00	949.9	937.4	2211	2222	112.00	235.85	388.58	
								2333
850.00	952.2	939.7	2211	2222	111.75	235.37	387.87	
								2333
852.00	954.6	942.1	2211	2223	111.49	234.89	387.17	
								2333
854.00	956.9	944.4	2212	2223	111.23	234.40	386.47	
								2334
856.00	959.2	946.7	2212	2223	110.98	233.93	385.77	
								2334
858.00	961.6	949.1	2212	2224	110.72	233.45	385.07	
								2334
860.00	963.9	951.4	2213	2224	110.47	232.97	384.37	
								2334
862.00	966.2	953.7	2213	2224	110.22	232.50	383.68	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2335
864.00	968.6	956.1	2213	2224	109.97	232.02	382.99	
								2335
866.00	970.9	958.4	2213	2225	109.72	231.55	382.30	
								2335
868.00	973.2	960.7	2214	2225	109.47	231.08	381.61	
								2335
870.00	975.6	963.1	2214	2225	109.22	230.61	380.92	
								2336
872.00	977.9	965.4	2214	2225	108.98	230.15	380.24	
								2336
874.00	980.2	967.7	2215	2226	108.73	229.68	379.56	
								2336
876.00	982.6	970.1	2215	2226	108.49	229.22	378.88	
								2336
878.00	984.9	972.4	2215	2226	108.24	228.76	378.20	
								2337
880.00	987.2	974.7	2215	2226	108.00	228.30	377.53	
								2337
882.00	989.6	977.1	2216	2227	107.76	227.84	376.85	
								2337
884.00	991.9	979.4	2216	2227	107.52	227.38	376.18	
								2337
886.00	994.3	981.8	2216	2227	107.28	226.93	375.51	
								2338
888.00	996.6	984.1	2216	2227	107.04	226.47	374.84	
								2338
890.00	998.9	986.4	2217	2228	106.80	226.02	374.18	
								2338
892.00	1001.3	988.8	2217	2228	106.56	225.57	373.51	
								2339
894.00	1003.6	991.1	2217	2228	106.33	225.12	372.85	
								2339
896.00	1006.0	993.5	2218	2228	106.09	224.67	372.19	
								2339
898.00	1008.3	995.8	2218	2229	105.86	224.23	371.53	
								2339
900.00	1010.6	998.1	2218	2229	105.63	223.78	370.88	
								2340
902.00	1013.0	1000.5	2218	2229	105.39	223.34	370.22	
								2340
904.00	1015.3	1002.8	2219	2229	105.16	222.90	369.57	
								2340
906.00	1017.7	1005.2	2219	2230	104.93	222.46	368.92	
								2340
908.00	1020.0	1007.5	2219	2230	104.70	222.02	368.27	
								2341
910.00	1022.3	1009.8	2219	2230	104.47	221.58	367.63	

TWO-WAY TRAVEL TIME FROM SRD MS	MEASURED DEPTH FROM KB M	VERTICAL DEPTH FROM SRD M	AVERAGE VELOCITY SRD/GEO M/S	RMS VELOCITY M/S	FIRST NORMAL MOVEOUT MS	SECOND NORMAL MOVEOUT MS	THIRD NORMAL MOVEOUT MS	INTERVAL VELOCITY M/S
								2341
912.00	1024.7	1012.2	2220	2230	104.25	221.15	366.98	
								2341
914.00	1027.0	1014.5	2220	2231	104.02	220.71	366.34	
								2342
916.00	1029.4	1016.9	2220	2231	103.79	220.28	365.70	
								2342
918.00	1031.7	1019.2	2220	2231	103.57	219.85	365.06	
								2342
920.00	1034.0	1021.5	2221	2231	103.34	219.42	364.42	
								2342
922.00	1036.4	1023.9	2221	2232	103.12	218.99	363.78	
								2343
924.00	1038.7	1026.2	2221	2232	102.90	218.56	363.15	
								2343
926.00	1041.1	1028.6	2222	2232	102.68	218.14	362.52	
								2343
928.00	1043.4	1030.9	2222	2232	102.46	217.71	361.89	
								2343
930.00	1045.8	1033.3	2222	2233	102.24	217.29	361.26	
								2344
932.00	1048.1	1035.6	2222	2233	102.02	216.87	360.63	
								2344
934.00	1050.4	1037.9	2223	2233	101.80	216.45	360.01	
								2344
936.00	1052.8	1040.3	2223	2233	101.58	216.03	359.38	
								2345
938.00	1055.1	1042.6	2223	2234	101.37	215.62	358.76	
								2345
940.00	1057.5	1045.0	2223	2234	101.15	215.20	358.14	
								2345
942.00	1059.8	1047.3	2224	2234	100.94	214.79	357.53	
								2345
944.00	1062.2	1049.7	2224	2234	100.72	214.37	356.91	
								2346
946.00	1064.5	1052.0	2224	2235	100.51	213.96	356.29	
								2346
948.00	1066.9	1054.4	2224	2235	100.30	213.55	355.68	
								2346
950.00	1069.2	1056.7	2225	2235	100.08	213.14	355.07	
								2346
952.00	1071.6	1059.1	2225	2235	99.87	212.73	354.46	
								2347
954.00	1073.9	1061.4	2225	2236	99.66	212.33	353.85	
								2347
956.00	1076.2	1063.7	2225	2236	99.45	211.92	353.25	
								2347
958.00	1078.6	1066.1	2226	2236	99.25	211.52	352.64	

570262

Schlumberger
GeoQuest

STC
PROCESSING

COMPANY:	Premier Oil Australasia	
WELL:	White Ibis-1	
FIELD:	Wildcat	
RIG:	N.Explorer III	COUNTRY: Australia

LATITUDE	: 039 57' 49.607" S
LONGITUDE	: 145 15' 17.234" E
DATE LOGGED	: 28-JUN-1998
RECORDED BY	: Y.Frans/B.Alshemme
PROCESSED BY	: D.Anestoudis

TABLE OF CONTENTS

1 INTRODUCTION **1**

1.1 DIGITAL SONIC APPLICATIONS 1
1.2 OPEN HOLE WAVEFORM MODES 1
1.2.1 Monopole *1*

2 FIELD EQUIPMENT AND SURVEY PARAMETERS **3**

2.1 ELEVATIONS 3
2.2 BOREHOLE PROPERTIES 3
2.3 TOOL SPECIFICATIONS 3
2.4 ACQUISITION COMMENTS 3

3 SLOWNESS TIME COHERENCE PROCESSING **4**

3.1 PRE-PROCESSING 4
3.2 SEMBLANCE PROCESSING 4
3.3 LABELING 4
3.5 BOREHOLE COMPENSATION 5

4 MULTI SHOT SEMBLANCE PROCESSING **8**

5 STC RESULTS **9**

5.1 DISCUSSION OF RESULTS 9
5.1.1 Slowness Time Coherence Processing *9*

TABLE OF FIGURES

Figure 1 Array Sonic Waveforms from Sonic Digital Tool (SDT). 2
Figure 2 STC Semblance Processing Technique. 5
Figure 3 STC Contour Plot and Dot Log. 6
Figure 4 Normal Transmitter-Receiver Configuration for STC Processing. 7
Figure 5 Multi Shot Configuration for Receiver Mode Processing. 7
Figure 6 Transmitter-Receiver Configuration for Multi-Shot Processing. 8

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions as set out in our current Price Schedule.

1 INTRODUCTION

Array Sonic Waveforms were recorded using the Sonic Digital Tool (SDT-C) in the White Ibis-1 well on the 28th of JUNE 1998.

Below is a list of the service runs used for STC processing:

	Tool	Mode(s)	Depth Interval	File Name	Comments
Suite-1	SDT-C	Monopole (MPS)	1300m - 2210m	SDTC.483	Main log

MPS = Monopole source P-wave and S-wave,

Standard eight level Slowness Time Coherence (STC) was performed to find the slowness of the compressional and shear from monopole waveforms. This report describes the processing, the parameters chosen and discusses the final results.

1.1 Digital Sonic Applications

Present applications of the Acoustic Waveforms processing include:

⇒ Better ΔT measurement
⇒ High Resolution
⇒ Mechanical Properties (sanding, wellbore stability)
⇒ Gas Detection
⇒ Fracture Detection
⇒ AVO Constraints
⇒ Shear Synthetic Seismogram
⇒ OVSP/WSP Constraints
⇒ Pseudo Permeability
⇒ Pseudo Fracture Width

The DSI was used to record waveforms in this well for the following reasons.

- To provide an accurate $DT_{compressional}$ and DT_{shear} over the entire interval.

1.2 Open Hole Waveform Modes

1.2.1 Monopole

Three main events can be identified in monopole generated open hole waveforms (Figure 1):

- The compressional arrival
- The shear arrival, when $V_{shear} > V_{mud}$
- The Stoneley arrival

The shear headwave is only present in the formation when the formation shear velocity is greater than the mud velocity. When $V_{shear} < V_{mud}$ the shear energy is transmitted into the formation away from the borehole. The direct fluid arrival will be the next waveform detected by the array unless a Stoneley mode is present.

The Stoneley velocity and amplitude are a complex function of the formation shear modulus, formation bulk density, borehole diameter, and borehole rigidity. Depending on conditions, the Stoneley mode may dominate the fluid arrivals. On the other hand, it may not be excited and not be evident in the recorded waveforms. The DSI can be run in a special "Stoneley Mode" (lower frequency) to ensure that Stoneley waves are always generated if Stoneley related applications (permeability for example) are desired.

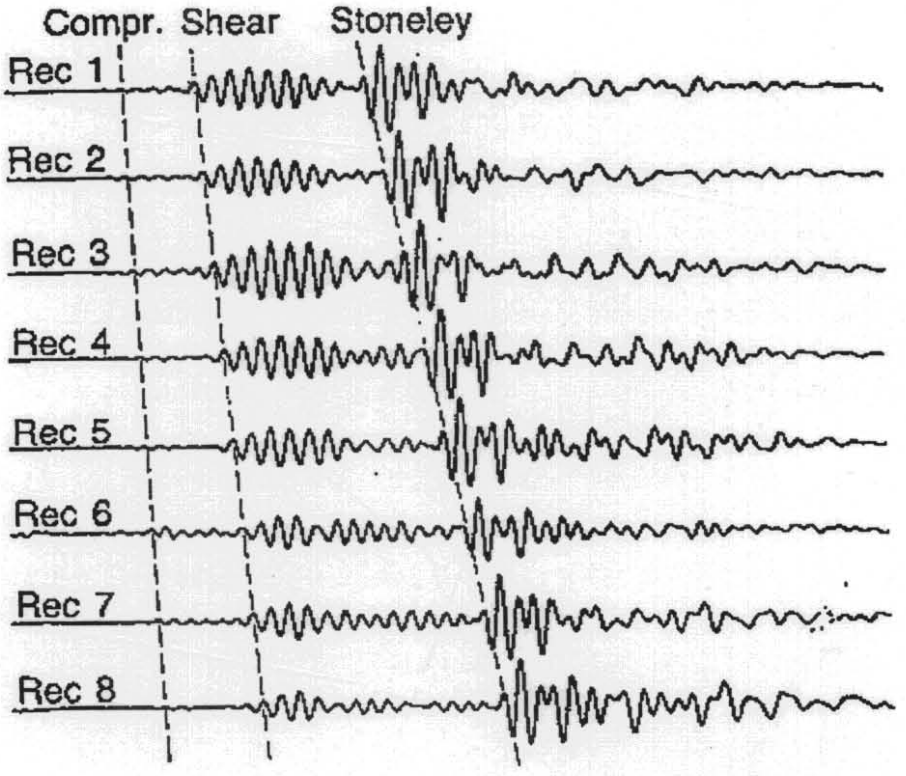


Figure 1 Array Sonic Waveforms from Sonic Digital Tool (SDT).

2 FIELD EQUIPMENT AND SURVEY PARAMETERS

2.1 Elevations

Kelly Bushing	12.5 m
Ground Level	-81.5 m
Drill Floor	12.5 m

2.2 Borehole Properties

	Suite #1
Bit Size	12.25 in
Surface Temperature	14 °C
Maximum Recorded Temperature	116 °C
Fluid Type	KCl/PHPA
Mud Density	1.09 g/cm^3
Mud Viscosity	41 S
Fluid Loss	

2.3 Tool Specifications

SDT-C

Tool used	Sonic Digital Tool (SDT-C)
Modes used	Monopole P&S
Tool Position	Centralised
Temperature rating	350 °F [175 °C]
Pressure rating	20,000 psi [138 MPa]
Tool diameter	35/8 in. [9.2 cm]
Minimum hole size	45/8 in. [11.8 cm]
Recommended maximum hole size	18 in. [45.7 cm]
Tool length	35.4 ft [10.8 m]
Tool weight	270 Kg
Transmitter to nearest receiver distance	96 in. [2.44 m]
Sampling interval	10 µsec (P&S mode)
Digitizer precision	12 bits
Digitizer sampling interval limits	Variable from 10 µsec to 32,700 µsec per sample
Digitized waveform duration limits	Up to 15,000 samples/all waveforms
Acoustic bandwidth	8 kHz to 30 kHz (High-frequency monopole)

2.4 Acquisition Comments

Recording was made on the Schlumberger Maxis 500 Unit using DLIS format.
The monopole waveforms were of good quality. The shear energy is unreliable above 1878m depth. The compressional energy above 1330m disappears due to poor coupling between the casing and the formation.

3 Slowness Time Coherence Processing

The objective of Slowness Time Coherence (STC) processing is to find the slowness of all coherent, non-dispersive propagating waves excited in the borehole as they pass the array of sonic receivers. The following steps are carried out in a normal waveform-processing job. A detailed list of the processing parameters used is listed in Appendix 1.

3.1 Pre-Processing

The SDT-C tool has 12-bit digitisation, which is enough dynamic range to measure all modes with sufficient resolution. All the sonic waveforms were normalised to their true amplitudes applying the scaling factors stored in normalisation channels. Any DC level and the T_0 pulse are also removed at this stage.

The waveforms are also frequency filtered to attenuate unwanted noise modes. The types of filters used in this case were as follows.

Monopole Waveforms:
A 5 - 15 kHz, 101 point Butterworth filter was applied on the SDT-C monopole generated waveforms.

3.2 Semblance Processing

The Slowness Time Coherence computes all the semblance values in the Slowness/Time (S/T) plane, see Figure 2 for illustration of this method. Contours are formed within this plane by peaks having the highest local coherence. The most coherent peak in each contour gives the Slowness and Time coordinates of an arrival (Figure 3). The primary output of the semblance processing are peak matrix arrays which will be passed to the subsequent labeling processing . The Slowness/Time plane projection on the slowness axis is also output as quality control displays (see the QC and STC plots).

STC processing can also be performed on the waveforms stored at the same depth but with different transmitter spacing as illustrated in Figure 4. This is the so-called ***transmitter mode*** which gives independent S/T planes.

3.3 Labeling

The coherence peaks are identified in the Slowness/Time planes as compressional, shear, Stoneley, casing or fluid events. A sophisticated tracking algorithm is invoked which recognises consistent arrivals.

In areas where the peak semblance is not clearly defined, manual editing is necessary. This is performed interactively on a GeoFrame workstation using the other well logs as a guide.

5 cm

3.4 Borehole Compensation

The independent ΔT derived for both receiver and transmitter modes are averaged permitting a borehole correction for tool tilt and rugose hole.

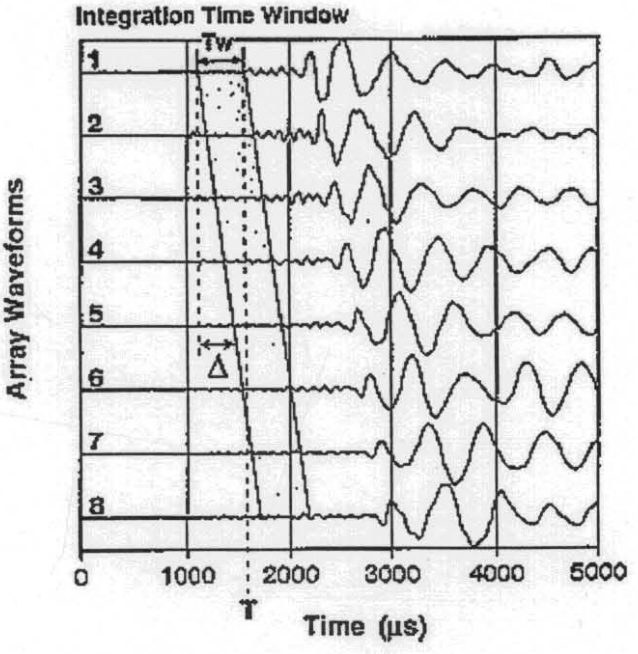


Figure 2 STC Semblance Processing Technique.

To detect the correlatable components, STC evaluates a semblance value for all possible times and move outs in the array (Figure 2). First a time window, Tw, is positioned on the first waveform, at a time T which corresponds to the end of the window. A window of equal length is opened on every subsequent waveform at times that follow a move out Δ like a corridor. The semblance is calculated across this corridor with the equation:

$$\sigma = \sqrt{\frac{1}{n}\cdot\frac{E_c(T,\Delta)}{E_i(T,\Delta)}}$$

where $E_i(T,\Delta)$ is the Incoherent Energy defined as:

$$E_i(T,\Delta) = \sum_{i=1}^{n}\int_{0}^{Tw}\left[x_i\left(t-\left[T+\Delta(z_i-z_1)\right]\right)\right]^2.d_t$$

and $E_c(T,\Delta)$ is the Coherent Energy defined as:

$$E_c(T,\Delta) = \int_0^{Tw}\left[\sum_{i=1}^{n} x_i\left(t-\left[T+\Delta(z_i-z_1)\right]\right)\right]^2 .d_t$$

n is the number of receivers, $x_i(t)$ are the samples from waveform i, and z_i are the waveform depths.

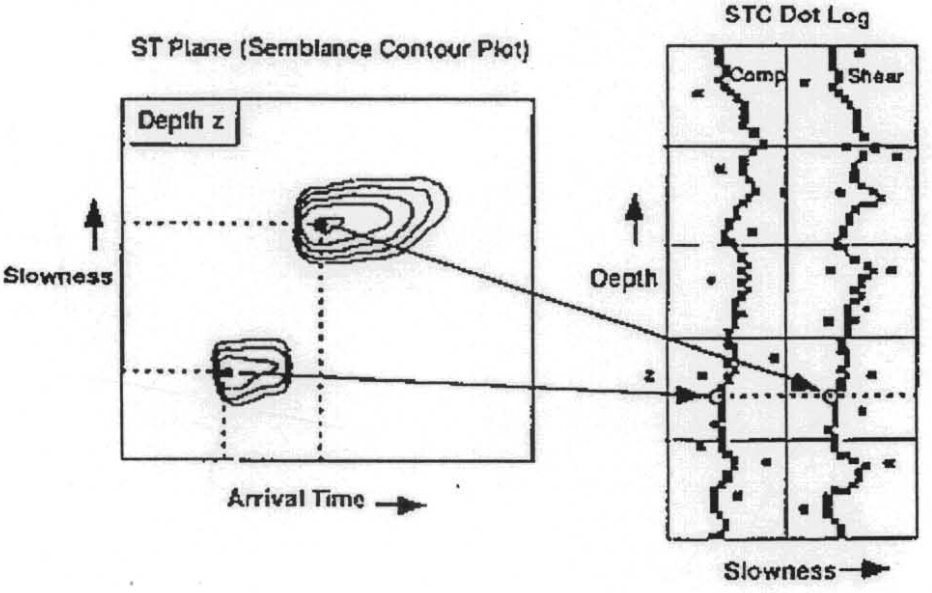
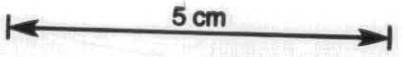


Figure 3 STC Contour Plot and Dot Log.



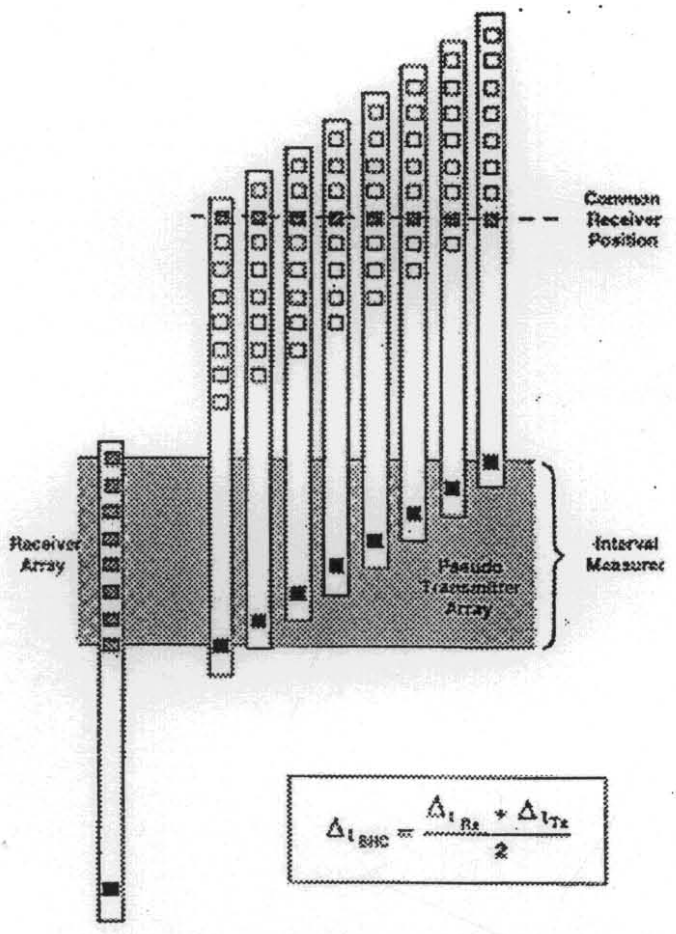


Figure 4 Normal Transmitter-Receiver Configuration for STC Processing.

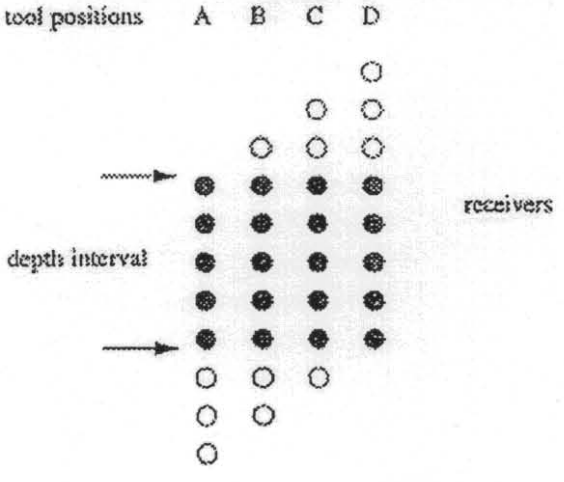


Figure 5 Multi Shot Configuration for Receiver Mode Processing.

4 Multi Shot Semblance Processing

The multi-shot STC technique improves the vertical resolution of the slowness log by taking advantage of the fact that a sonic-array tool measures the same formation interval several times while the tool is being dragged past that interval. The vertical resolution of the slowness log is related to the length of the receiver array used to estimate the slowness For example, by using only 5 of the 8 receivers, the vertical resolution can be improved to 2 feet. However, the signal to noise ratio decreases because the amount of data in the processing is reduced. To compensate for this degradation, the multi-shot STC technique exploits the redundant information available in the recorded waveform data (Figure 5 and Figure 6).

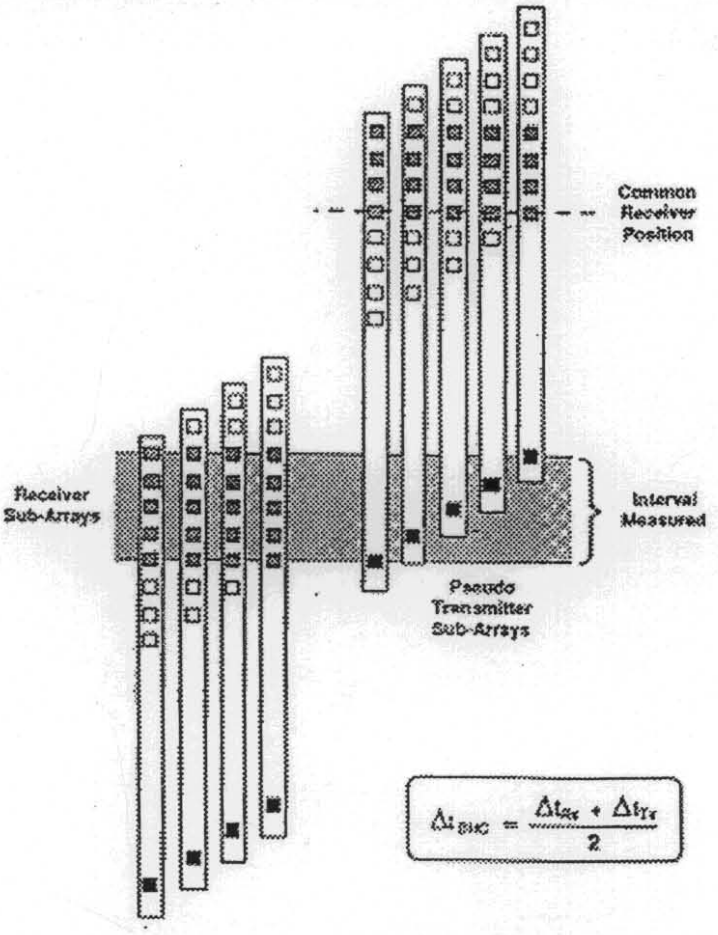


Figure 6 Transmitter-Receiver Configuration for Multi-Shot Processing.

5 STC RESULTS

5.1 Discussion of Results

5.1.1 Slowness Time Coherence Processing

The waveforms were unpacked and then each receiver-waveform was inspected. All of the monopole waveforms were of good quality with no apparent problems. A 5-15 kHz butterworth filter was used to remove any unnecessary information from the data prior to Slowness Time Coherence (STC) processing.
The entire interval was processed using STC from 40 us/ft to 240 us/ft. This provided sufficient coverage to resolve the compressional, shear, and mud-arrival events.
The compressional event was detected between the interval 1330m to 2210m as shown on the QC PLOT. The compressional event between depths 2210m and 1878m was characterised by a strong and coherent single-peak, which was identified as the fastest event detected by the STC processing. Above 1878m depth the compressional was recorded behind casing. Above 1400m depth the compressional signal deteriorates, this is due to the poor coupling between the casing and the juxtaposed formation.
The shear event was detected over most of the open hole logged interval. For the entire cased hole interval the slowness of the formation was slower than or very similar to the slowness of the mud-arrival event, hence shear information over that interval was transmitted away from the receivers (shear was lost in the formation).

Appendix 1

Sonic Waveforms Preprocessor

	SDT-C
Start Depth (m)	2210
Stop Depth (m)	1300
# Records	8
# Samples	498
Start Time (μs)	0
Interval (μs)	10
T-Geometry (ft)	5.25
R-Geometry (ft)	15.25
Depth Shift (ft)	-10.25
TR Spacing (ft)	10.00
DC Removal	NA
DCW Start (μs)	480
DCW Stop (μs)	480
Amp. Restore	ON
Delete Inputs	ON
RR Spacing (ft)	0.5
Output Wave	SWF%r.SDT.%f.SWP

Waveform Inspection

	SDT
R1 (WF1)	✓
R2 (WF2)	✓
R3 (WF3)	✓
R4 (WF4)	✓
R5 (WF5)	✓
R6 (WF6)	✓
R7 (WF7)	✓
R8 (WF8)	✓

Filter

	SDT P&S
Filter Type	BPBUTW
Filter Length	101
Frequency Band Low (kHz)	5
Frequency Band High (kHz)	15
Fall-off Rates (Low)	30
Fall-off Rates (High)	100

Slowness Time Coherence

	SDT P&S
Integration Time Window (μs)	230
Slowness Lower Limit (μs/ft)	40
Slowness Upper Limit (μs/ft)	240
Slowness Step (μs/ft)	4
Time Lower Limit (μs)	400
Time Upper Limit (μs)	3800
Time Step (μs)	80
Search Band Width (μs)	2197
Search Band Offset (μs)	298
Slowness Width (μs/ft)	20
Time Width (μs)	1680
DC Lower Limit (μs)	0
DC Upper Limit (μs)	360
DC Move Out (μs/ft)	40
Signal Lower Limit (μs)	400
Signal Upper Limit (μs)	3800
Signal Move Out (μs/ft)	40
Time for Baseline Fill (μs)	300
Baseline Removal Upper Limit (μs)	0
MSTC Semblance Threshold	0.4
Expansion Factor	1
Normalization Flag	True

Sonic Labelling

	SDT
Integration Time Window (μs)	320
Shear/Comp Minimum Ratio	1.4
Shear/Comp Maximum Ratio	3
Comp Slowness Lower Limit (μs/ft)	40
Comp Slowness Upper Limit (μs/ft)	140
Shear Slowness Lower Limit (μs/ft)	100
Shear Slowness Upper Limit (μs/ft)	180
Mud Slowness (μs/ft)	189
Casing Slowness (μs/ft)	57
Casing Function	50
Formation Character	DYNA

Glossary

Below is a glossary for the output channel names appearing on the displays and the tape.

Name	Description
DT1R	Lower Dipole receiver mode Delta T
DT1T	Lower Dipole transmitter mode Delta T
DT1	Borehole compensated Lower Dipole Delta T
DT2R	Upper Dipole receiver mode Delta T
DT2T	Upper Dipole transmitter mode Delta T
DT2	Borehole compensated Upper Dipole Delta T
DTRP	P&S receiver mode compressional Delta T
DTTP	P&S transmitter mode compressional Delta T
DT4P	Borehole compensated P&S compressional Delta T
DTRS	P&S receiver mode shear Delta T
DTTS	P&S receiver mode shear Delta T
DT4S	Borehole compensated P&S shear Delta T
DTCO	Borehole compensated compressional Delta T used for Poisson's Ratio and Vp/Vs calculation
DTSM	Borehole compensated shear delta T used for Poisson's Ratio and Vp/Vs calculation
PR	Poisson's Ratio
VPVS	Vp/Vs ratio
GR	Gamma ray
CALI	Caliper from LDT
BS	Bit size
RHOZ	Bulk Density from LDT
TNPH	Neutron Porosity from CNT
AHO10	Resistivity, AIT-H induction log, one-foot vertical resolution, 10-inch depth of investigation.
AHO90	Resistivity, AIT-H induction log, one-foot vertical resolution, 90-inch depth of investigation.

References

1. Kimball, C.V., and Marzetta, T.L., 1986, "Semblance Processing of Borehole Acoustic Array Data": Geophysics, 49, 274-281.
2. Kurkjian, A.L. and Chang, S-K., 1986, "Acoustic Multipole Sources in Fluid-filled Boreholes": Geophysics, 51, 148-162.
3. DSI Services, Schlumberger Internal Publication

STC PROCESSING SDTM.TA.P45

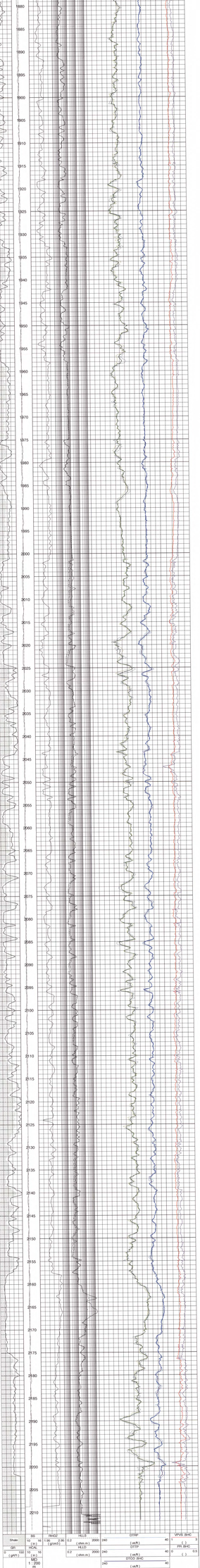
Project	Study 1
Protocol	Study 1
Compound	Placebo & Tadalafil
Subjects	Healthy Volunteers
Design	Single Dose, 2-Period, 2-Sequence, Crossover
Analysis	Pharmacokinetic
Matrix	Plasma
Species	Human
Strain	N/A
Dose Level	20 mg
Dose Route	Oral
Dose Regimen	Single Dose
Dose Volume	200 mL
Dose Frequency	Once
Dose Duration	N/A
Dose Start Date	2024-03-15
Dose End Date	2024-03-15
Dose Start Time	08:00
Dose End Time	08:00
Dose Start Day	1
Dose End Day	1
Dose Start Period	1
Dose End Period	1
Dose Start Sequence	1
Dose End Sequence	1
Dose Start Subject	1
Dose End Subject	1
Dose Start Visit	1
Dose End Visit	1
Dose Start Week	1
Dose End Week	1
Dose Start Month	1
Dose End Month	1
Dose Start Year	2024
Dose End Year	2024
Dose Start Date	2024-03-15
Dose End Date	2024-03-15
Dose Start Time	08:00
Dose End Time	08:00
Dose Start Day	1
Dose End Day	1
Dose Start Period	1
Dose End Period	1
Dose Start Sequence	1
Dose End Sequence	1
Dose Start Subject	1
Dose End Subject	1
Dose Start Visit	1
Dose End Visit	1
Dose Start Week	1
Dose End Week	1
Dose Start Month	1
Dose End Month	1
Dose Start Year	2024
Dose End Year	2024

CONFIDENTIAL

This page contains proprietary and confidential information. Unauthorized reproduction, distribution, or disclosure of this page or any portion of its contents is strictly prohibited. The information on this page is intended solely for the recipient and may not be used for any purpose other than that for which it was provided. If you have received this page in error, please notify the sender immediately and destroy all copies. Page 1 of 1

Page	1
Total Pages	1
Date	2024-03-15
Time	08:00
Day	1
Period	1
Sequence	1
Subject	1
Visit	1
Week	1
Month	1
Year	2024

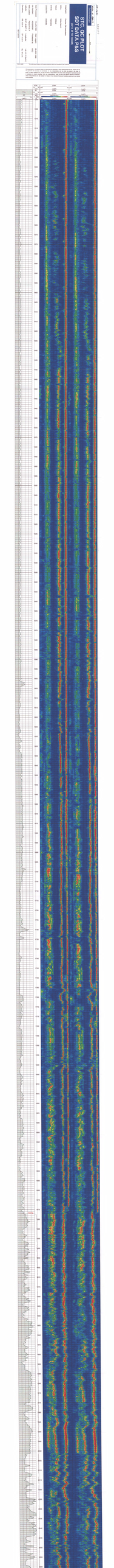
Study	1
Protocol	1
Compound	Placebo & Tadalafil
Subjects	Healthy Volunteers
Design	Single Dose, 2-Period, 2-Sequence, Crossover
Analysis	Pharmacokinetic
Matrix	Plasma
Species	Human
Strain	N/A
Dose Level	20 mg
Dose Route	Oral
Dose Regimen	Single Dose
Dose Volume	200 mL
Dose Frequency	Once
Dose Duration	N/A
Dose Start Date	2024-03-15
Dose End Date	2024-03-15
Dose Start Time	08:00
Dose End Time	08:00
Dose Start Day	1
Dose End Day	1
Dose Start Period	1
Dose End Period	1
Dose Start Sequence	1
Dose End Sequence	1
Dose Start Subject	1
Dose End Subject	1
Dose Start Visit	1
Dose End Visit	1
Dose Start Week	1
Dose End Week	1
Dose Start Month	1
Dose End Month	1
Dose Start Year	2024
Dose End

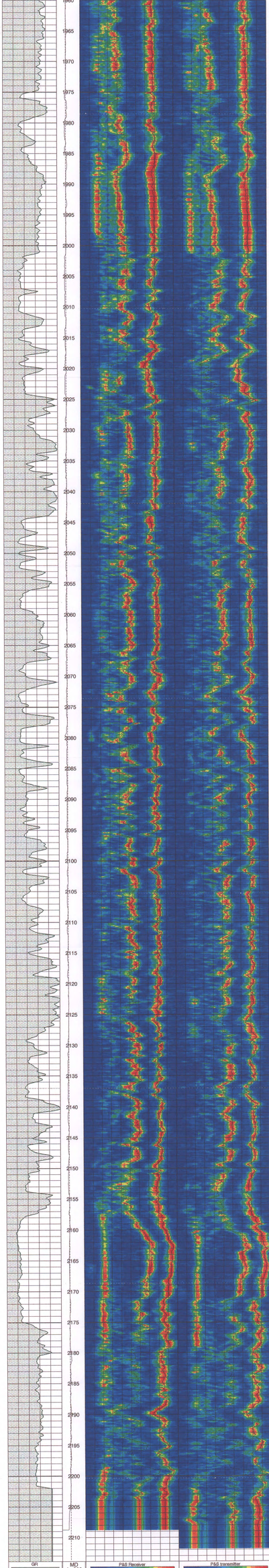


5 cm

Company:	Premier Oil Australasia
Well:	White Ibis #1
FIELD:	Wildcat
RIG:	N. Explorer III
STATE:	Tasmania
Date Logged:	29-JUN-1998
Well Location:	Permit T/18 P Easting : 350 947m
Date Processed:	16-JUL-1998
Elevations:	KB: 12.5 m DF: 12.5 m GL: -61.9 m
API Number:	Job Number:

Schlumberger


SIS QC PLOT
SIS 5.0 (64 bit)
Client: Shell International Exploration and Production B.V.
Project: Shell Projects
Area: Unknown
Block: Unknown
Contractor: Unknown
Vessel: Unknown
Survey: Unknown
Processor: Unknown
Processing Sequence: Unknown
Processing Parameters: Unknown
Comments: Unknown
Line: 1
Shotpoint: 1
Time: 2012-01-01 00:00:00
Latitude: 0.000000
Longitude: 0.000000
Depth: 0.00
Water Depth: 0.00
Tide: 0.00
Heading: 0.00
Speed: 0.00
Gun Depth: 0.00
Streamer Depth: 0.00
Streamer Tail Buoy: 0.00
Streamer Feather: 0.00
Streamer Separation: 0.00
Streamer Offset: 0.00
Streamer Azimuth: 0.00
Streamer Tail Buoy Azimuth: 0.00
Streamer Feather Azimuth: 0.00
Streamer Separation Azimuth: 0.00
Streamer Offset Azimuth: 0.00
Streamer Tail Buoy Offset: 0.00
Streamer Feather Offset: 0.00
Streamer Separation Offset: 0.00
Streamer Offset Offset: 0.00
Streamer Tail Buoy Offset Azimuth: 0.00
Streamer Feather Offset Azimuth: 0.00
Streamer Separation Offset Azimuth: 0.00
Streamer Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset: 0.00
Streamer Feather Offset Offset: 0.00
Streamer Separation Offset Offset: 0.00
Streamer Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset: 0.00
Streamer Offset: 0.00
Streamer Tail Buoy Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Feather Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Separation Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Offset Azimuth: 0.00
Streamer Offset Azimuth: 0.00
Streamer Tail Buoy Offset: 0.00
Streamer Feather Offset: 0.00
Streamer Separation Offset: 0.00
Streamer Offset: 0.00
Streamer Tail Buoy Offset Azimuth: 0.00
Streamer Feather Offset Azimuth: 0.00
Streamer Separation Offset Azimuth: 0.00
Streamer Offset Azimuth: 0.00
Streamer Tail Buoy Offset: 0.00
Streamer Feather Offset: 0.00
Streamer Separation Offset: 0.00
Streamer Offset: 0.00
Streamer Tail Buoy Offset Azimuth: 0.00
Streamer Feather Offset Azimuth: 0.00
Streamer Separation Offset Azimuth: 0.00
Streamer Offset Azimuth: 0.00
Streamer Tail Buoy Offset: 0.00
Streamer Feather Offset: 0.00
Streamer Separation Offset: 0.00
Streamer Offset: 0.00
Streamer Tail Buoy Offset Azimuth: 0.00
Streamer Feather Offset Azimuth: 0.00
Streamer Separation Offset



Company:	Premier Oil Australasia		
Well:	White Ibis #1		
FIELD:	Wildcat		
RIG:	N. Explorer III		
STATE:	Tasmania		
Date Logged:	29-JUN-1998	Date Processed:	16-JUN-1998
Well Location:	Permit T/18 P Easting : 350 947m		5 cm
Elevations:	KB: 12.5 m	DF: 12.5 m	GL: -61.9 m
API Number:		Job Number:	

Schlumberger

570278

PremierOil
Australasia

T/18P

WHITE IBIS-1
WELL COMPLETION REPORT
VOLUME 2 of 2

NOVEMBER 1998

570279

APPENDIX 10

POSITIONING REPORT

By

RACAL

WHITE IBIS 1

570280

POSITIONING REPORT

OF THE DRILLING RIG

NORTHERN EXPLORER III

FOR

PREMIER OIL AUSTRALIA PTY LIMITED

LOCATION	**:**	**WHITE IBIS-1**
DATED	**:**	**20 MAY TO 2 JUNE 1998**
REPORT REF.	**:**	**2767A3**

RACAL

570281

CONTENTS

		Page No.
Location map		
1.	INTRODUCTION	4
2.	SUMMARY	5
2.1	Requirements	5
2.2	Summary of Events	6
3.	GEODETIC PARAMETERS	8
3.1	Datums	8
3.2	Projection	8
3.3	Datum Transformation	8
3.4	Geoid/Spheroid Separation	9
4.	GLOBAL POSITIONING SYSTEM (GPS)	10
4.1	System Description	10
4.2	GPS Observations	11
4.3	Differential GPS (DGPS)	12
4.4	SkyFix/SkyFix Spot Differential Link	13
4.5	Trimble 4000DS GPS Receiver	14
5.	GYRO CALIBRATION	15
6.	FINAL RIG POSITION	16
6.1	Final Differential GPS Position	16
6.2	Positioning of Anchors	18
6.3	Wave Rider Buoy Location	19
7.	PERSONNEL AND EQUIPMENT	20
7.1	Personnel	20
7.2	Equipment	21
8.	DISTRIBUTION	22

570282

APPENDICES

A - OFFSET DIAGRAM - NORTHERN EXPLORER III

B - GNS SYSTEM SET-UP PARAMETERS

C - GYRO CALIBRATION

D - NAVIGATION CHECK – POSITION FIX AND GRAPHICS PRINTOUTS - YOLLA-2

E - GRAPHICS PRINTOUT RIG POSITION AT CASING BLASTS - YOLLA-2

F - DGPS DRILLSTEM POSITION FIX PRINTOUT - WHITE IBIS-1

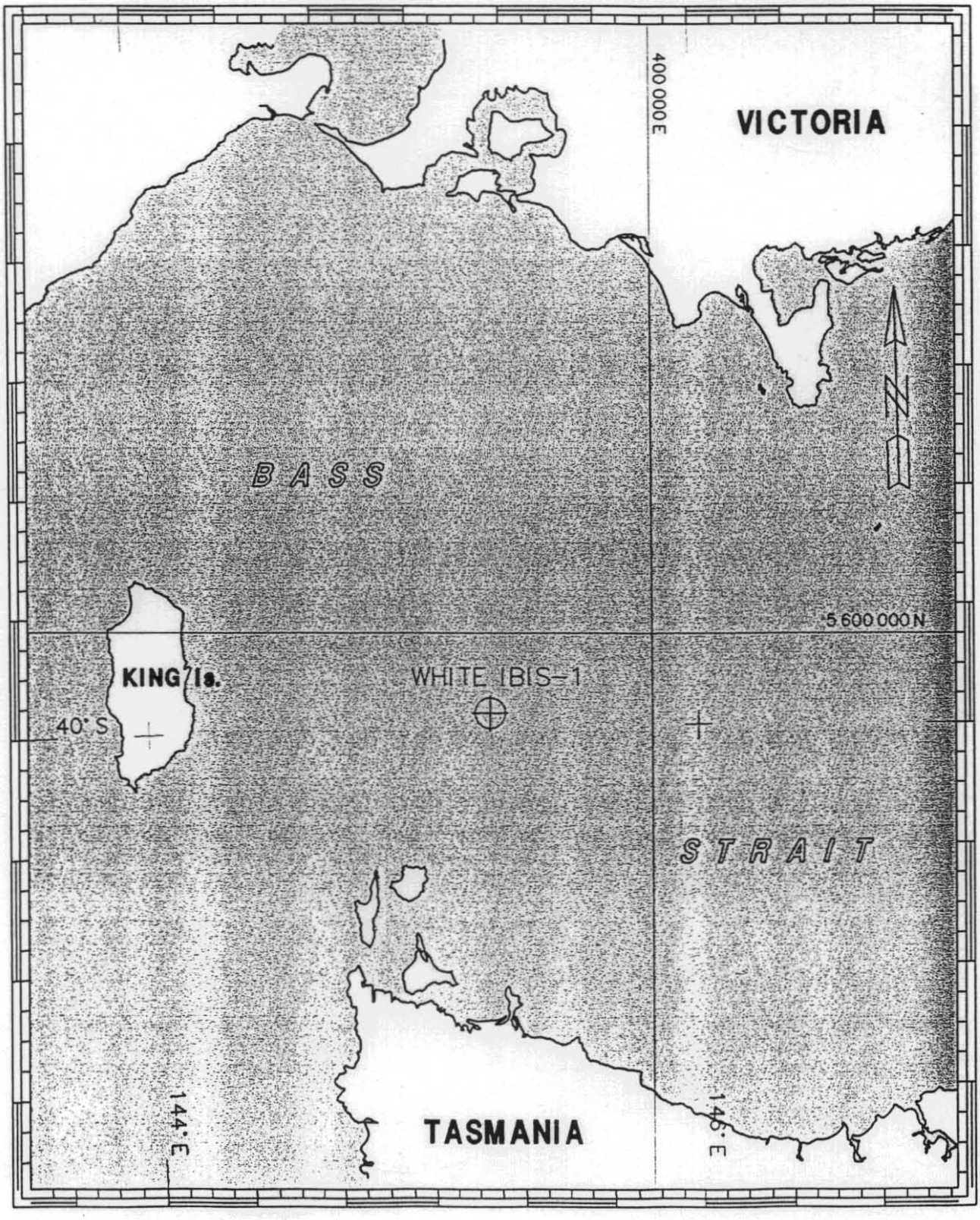
G - GNS GRAPHICS PRINTOUT - WHITE IBIS-1

H - ANCHOR PATTERN DETAILS - WHITE IBIS-1

I - DAILY LOG SHEETS

570283

GENERAL LOCATION DIAGRAM



1. INTRODUCTION

This report details the survey services provided by Racal Survey Australia Limited (Racal), prior to and during the positioning of the drillship Northern Explorer III at the White Ibis-1 location, in the Bass Strait, for Premier Oil Australia Pty Limited (Premier Oil).

Positioning of the Northern Explorer III during the approach to and over the location was provided by Racal's SkyFix Spot Differential GPS (DGPS), interfaced via Racal's multiple reference station software, MultiFix 2, to Racal's General Navigation System (GNS) software, version 416A. Racal's SkyFix Differential GPS was utilised as the secondary differential system for onboard positioning of the Northern Explorer III.

The drillship Northern Explorer III was positioned over the White Ibis-1 wellhead on 1 June 1998.

White Ibis-1 Proposed Location

The proposed co-ordinates of the White Ibis-1 location were provided by Premier Oil and are as follows:

Datum AGD 84

Latitude	:	39° 57' 49.61" South
Longitude	:	145° 15' 17.28" East

AMG Zone 55 C.M. 147° East

Easting	:	350 947.0 m
Northing	:	5 574 789.1 m
Intended Rig Heading	:	265° (T)

White Ibis-1 Differential GPS Final Fix Position

The final surface position of White Ibis-1, as observed by Differential GPS on 1 June 1998 was:

Datum AGD 84

Latitude	:	39° 57' 49.607" South
Longitude	:	145° 15' 17.234" East

AMG Zone 55 C.M. 147° East

Easting	:	350 945.86 m
Northing	:	5 574 789.15 m
Final Rig Heading	:	272.6° (T)

The final Differential GPS position is 1.15 metres on a bearing of 278.7° (True) from the White Ibis-1 intended location.

2. SUMMARY

2.1 REQUIREMENTS

Racal Survey Australia Limited (Racal) were contracted by Premier Oil Pty Limited (Premier Oil) to provide personnel and positioning equipment consisting of Racal's SkyFix/SkyFix Spot Differential GPS for the rig move of the Northern Explorer III to the White Ibis-1 location. Racal's GNS software was used with the SkyFix/Skyfix Spot Differential GPS to provide online navigation of the drill ship and final drill ship position.

The requirements were to provide the following:

(a) Real-time positioning for the drill ship Northern Explorer III during the approach and positioning at the White Ibis-1 location.

(b) Real-time bearings and distances for the anchor handling vessels from the fairleads on the drill ship to the intended anchor positions.

(c) A preliminary position of the drill ship prior to pre-tensioning and final positioning.

(d) At the completion of pre-tensioning, a differential GPS drillstem position which was acceptable to the Client Representative.

2.2 SUMMARY OF EVENTS

Racal Engineer P. Ananth departed Kuala Lumpur at 0700 for Melbourne via Singapore and Sydney on 20 May, 1998. Racal Surveyor, J. Tighe arrived in Melbourne from Brisbane at 1700. I. Scorgie, the Premier Oil client representative arrived in Melbourne from Perth at 1730. Personnel were accommodated at the Tullamarine Travelodge.

On 21 May 1998, personnel arrived at Essendon Airport at 0930 in preparation for helicopter travel to the drilling rig Northern Explorer III. At 1140, advice was received that the second helicopter to the rig had been cancelled, and that survey personnel were to over-night in Melbourne.

At 1210 on 22 May 1998, personnel departed Essendon Airport for Northern Explore III, arriving at 1315. At 1440, following a Safety Induction for the Racal personnel, mobilisation of the survey equipment commenced. Due to a severe weather warning, the anchor handling vessel Brute Tide departed location for safe anchorage at 1735, while the rig was battened down and secured by 1815.

The survey navigation equipment was online by 1910 using antenna offsets from the previous move of the rig. Using the SkyFix Spot Differential GPS (DGPS) and a manual gyro compass heading, the rig position was indicated to be within 3 metres of the published location of the Yolla-2 well. The survey gyrocompass and SkyFix (DGPS) were online by 2045. At a reported time of 2250, the rig was moved to a location approximately 22 metres south west of the well head. An I-beam was reportedly lost while moving to this location.

The rig remained on weather standby on 23 May 1998 during winds of up to 70 knots with the maximum swell height recorded on the wave rider buoy up to 10.5 metres. The rig was moved back to within 10 metres of the well head during the evening.

The GPS antenna offsets were check measured at 0950 on 24 May 1998. Due to the strong winds and movement of the drill ship, a sun observation for a gyro compass calibration was not attempted. At 1300, safety videos were shown in lieu of a fire drill.

An observation of the Racal gyro compass rig heading relative to the sun azimuth was completed at 1658. Due to the heavy cloud cover, only two observations were possible. The drill ship's marine sextant was utilised for the observations. A C-O of –2.26° was derived. A C-O of -2° was applied in the navigation computer. (Refer to Appendix C.) The rig was winched to the Yolla-2 well head by 1852, with the rig indicated to be within 3 metres of the published location.

On 25 May 1998 at 0730 a gyro calibration by marine sextant calculated a C-O of –2.58°. (Refer to Appendix C.) The ROV entered the water at 0745 for inspection of the casing cutting operations. A 20 minute fix of the rig position, commencing at 1040, confirmed the drill string to be within 1.3 metres of the published location of the well head. (Refer to Appendix D.)

At 1534 on 26 May 1998, a gyro calibration by sun azimuth observation using a Theodolite calculated a C-O of –2.50°. The Racal gyro (corrected) and the ship's Sperry gyro compasses were recorded to differ by 0.2°.

The Pacific Commander rigged for grappling the sunken number 8 buoy and chain by 1730. The number 8 piggy back, anchor, buoy and chain were retrieved by 0146 on 27 May 1998 when the rig commenced recovery of the number 8 wire. At 0359 the number 1 anchor was lifted, then re-dropped at 0434 in a new position (closer to the rig) in preparation for the rig to stand off for blasting of the well head.

The well head charge was detonated at 0607 with the rig in the stand off location. (Refer to Appendix E.) The rig was winched back to the well head location by 0721. The rig position adjustments using the ROV visual data were completed by 1115. The Differential GPS antenna was moved to a new position at 1345 to improve the reception of the GPS signals, following which the ECL Q-Star QC navigation system was interfaced to the Racal Trimble antenna using a GPS antenna splitter.

With the rig in the stand off location, an additional charge was detonated at 0442 on 28 May 1998. (Refer to Appendix E.) The rig returned to location at 0529. At 0910 a check of the navigation system was requested as the well head position could not be found by the ROV. The navigation system was checked, as well as being verified by the ECS Q-Star QC navigation system.

The ROV located the dropped I-beam at 0930 in a position reported as 27 metres south of the existing well head. At 1055 the rig was winched to this location, then moved 12 metres astern to recover the I-beam at 1405. Between 1448 and 1540 the SkyFix/SkyFix Spot Differential GPS corrections from the Australian stations were not received. The position of the rig was monitored using Differential GPS corrections from Auckland. The rig was stationary during this period. Operations were not affected. Number 5 and number 1 anchors were recovered between 1734 and 2200.

On 29 May 1998, the rig remained on weather standby.

At 0052 on 30 May 1998, the Brute Tide and the Pacific Commander commenced the recovery of anchors 4 and 7. This was completed by 0515. Number 2 wire from the Brute Tide was secured on the rig at 0910, with number 6 from the Pacific Commander secured at 1040. The Pacific Commander obtained a GPS position fix on the wave rider buoy at 1145. After number 3 wire from the Brute Tide was secured at 1248, the rig was under way to the White Ibis-1 location. At 1630 the rig anchor was dropped 1 mile west of the intended location to prepare for anchor handling operations.

A Fire/Emergency drill was completed on 31 May 1998 between 1315 and 1400. At 1523 the rig proceeded to the White Ibis-1 location with the Brute Tide running out anchor number 2 at 1822. Lowering of anchor number 2 commenced at 1836 to be on the bottom by 1858. Anchor number 6 was lowered from the Pacific Commander at 1916 and on the bottom at 2022. The Brute Tide lowered number 7 at 2215 to be on the bottom by 2256.

The Pacific Commander commenced running out number 3 at 0015 on 1 June 1998, with the anchor on bottom at 0136. Number 4 anchor was on bottom at 0503 from the Brute Tide. The Pacific Commander completed the lowering of number 1 between 0535 and 0538. At 1028, the Brute Tide commenced lowering number 5 anchor which was on bottom by 1127. After commencing the run out at 1044, the Pacific Commander placed number 8 anchor on the bottom at 1230. Cross tensioning of the anchors had commenced at 1202.

Pretensioning of the anchors was completed at 1720 on 1 June 1998. Following the move of the rig to the intended location, the adjustment of the wires to working tensions, and the approval of the rig position by the Company Representative, the final fix of position commenced at 1840. The fix was completed at 2000. The survey equipment was demobilised and packed by 2200 to await transfer by rig personnel from the bridge deck to the onboard container.

The container of survey equipment was transferred to the Pacific Commander during the evening. The Premier Oil Company Representative advised at 0815 on 2 June 1998 of the possibility that survey personnel would be required to remain onboard while the rig re-positioned. Advice was received at 0845 that the survey personnel were not required. Personnel departed the Northern Explorer III by helicopter for Essendon Airport at 0950 on 2 June 1998. Personnel departed Melbourne from the Tullamarine Airport on 2 June 1998.

3. GEODETIC PARAMETERS

Co-ordinates shown in this report are referred to the Australian Geodetic Datum 1984 (AGD 84).

The Global Positioning System (GPS) is referenced to the World Geodetic System 1984 (WGS 84).

3.1 DATUMS

Datum	:	**Australian Geodetic Datum 1984**
Spheroid	:	Australian National Spheroid
Semi-major Axis (a)	:	6 378 160.000m
Semi-minor Axis (b)	:	6 356 774.719m
Eccentricity Squared (e^2)	:	0.006 694 542
Flattening ($^1/_f$)	:	298.25
Datum	:	**World Geodetic System 1984**
Spheroid	:	WGS 84
Semi-major Axis (a)	:	6 378 137.000m
Semi-minor Axis (b)	:	6 356 752.314m
Eccentricity Squared (e^2)	:	0.006 694 380
Flattening ($^1/_f$)	:	298.257 223 563

3.2 PROJECTION

Projection	:	**Universal Transverse Mercator**
AMG Zone	:	55
Central Meridian (C.M.)	:	147° East
Scale factor on the C.M.	:	0.9996
False Easting	:	500 000m
False Northing	:	10 000 000m
Latitude of Origin	:	0° (Equator)
Unit of Measure	:	International Metre

3.3 DATUM TRANSFORMATION

The following 7-parameter datum transformation was used to convert WGS 84 co-ordinates to AGD 84 co-ordinates:

Dx	=	+ 116.00m
Dy	=	+ 50.47m
Dz	=	– 141.69m
Rx	=	+ 0.230"
Ry	=	+ 0.390"
Rz	=	+ 0.344"
Scale	=	– 0.0983 p.p.m.

Note: The sign conventions used in Racal software in the datum transformations were derived as follows:

GNS Survey Software:
The convention used is that used by the US Department of Defense and by Higgins (Transformation from WGS 84 to AGD 84 - An Interim Solution), where a positive rotation about the Z axis is an anti-clockwise movement of the X and Y axes (when viewed from the North Pole looking towards the centre of the Earth).

These values were adopted by the Inter-Governmental Advisory committee on Surveying and Mapping Standards for Control Surveys in May 1990.

3.4 GEOID/SPHEROID SEPARATION

The Geoid/Spheroid (WGS-84) separation (N), as computed from the OSU91A Geoid/Spheroid Model at the White Ibis-1 location is -0.938m.

4. GLOBAL POSITIONING SYSTEM (GPS)

4.1 SYSTEM DESCRIPTION

The NAVSTAR GPS (Navigational Satellite Timing and Ranging Global Positioning System) is an USA Military all weather, space-based positioning system that transmits signals from a constellation of satellites orbiting the Earth. It is capable of providing suitably equipped users world-wide with accurate three dimensional positions on, or near, the Earth's surface. The accuracy of these determined positions can vary from a few millimetres to 100 metres depending on the method of data acquisition and processing. System design consists of three integrated parts: the Ground Control Segment, the Space Segment and the User Segment.

The operational space segment consists of 24 production satellites and 3 active spares; the term Space Vehicle (SV) is used as a synonym for satellite. The satellites are in high orbits, at approximately 20,200km, having an orbit period of 12 hours. They are arranged in 6 orbital planes, inclined at 55 degrees with near circular orbits. The configuration provides complete 4 satellite (3D) coverage world-wide.

4.2 GPS OBSERVATIONS

There are two important types of GPS observations (observables):

Pseudo-range and Carrier phase.

Carrier phase is sometimes also referred to as carrier beat phase. Pseudo-range techniques are generally used for navigation e.g. Racal's MultiFix. In high-precision baseline surveying the carrier phase is used. Although the (undifferenced) phase can be used directly, it has become common practice, at least in surveying applications, to process certain linear combinations of the original carrier phase observations (double differences and triple differences).

Pseudo-ranges

The pseudo-range is a measure of the distance between the satellite and the receiver at the epochs of transmission and reception of the signals. The transit time of the signals is measured by comparing (correlating) identical pseudo-random noise (PRN) codes generated by the satellite and by the receiver. A code-tracking loop within the receiver shifts the internal replica of the PRN code in time until maximum correlation occurs. The codes generated at the receiver are derived from the receiver's own clock, and the codes of the satellite transmissions are generated by the satellite system of clocks. It follows that unavoidable timing errors in both the satellite and the receiver clock will cause the measured quantity (pseudo-range) to differ from the geometric distance.

In offshore applications, where instantaneous positions are required, Pseudo-range is the preferred observable. Given the satellite ephemeris (i.e. the position of the satellite at the epoch of transmission), there are seven unknowns: two clock errors, three receiver co-ordinates and the ionospheric and tropospheric delays. The effect of the satellite clock error is negligible for the typical navigation solution, particularly considering that the time errors are indistinguishable from the ionospheric and tropospheric delays. The satellite clocks are constantly monitored and synchronised with GPS time as maintained by the control centre. Actual offsets of the satellite clocks are approximated by polynomials in time and transmitted as part of the navigation message to the user for the correction of the measured pseudo-ranges. The ionospheric and tropospheric delays can be computed on the basis of ionospheric and tropospheric models, thus there are four unknowns left X, Y, Z and receiver clock error. These can be determined from four pseudo-ranges measured simultaneously to four GPS satellites.

Carrier Phase

The phase observable is the difference between the phase of the carrier signal of the satellite, measured at the receiver, and the phase of the local oscillator within the receiver at the epoch of measurement. This can be regarded as a biased range measurement of the satellite-receiver distance with the integer number of carrier waves being unknown. The wavelength of the L1 carrier is about 19cm. Because of the fraction of the carrier phase is measured, the term "interferometry" is often used to describe carrier phase techniques.

4.3 DIFFERENTIAL GPS (DGPS)

As the GPS is primarily a USA Defence system, the navigation accuracy to the civil user is degraded to about 100 metres standard deviation (Standard Position Service -SPS), as specified in the USA 1990 Federal Radio Navigation Plan. The means by which the USA Military degrade GPS is with the use of Selective Availability (SA) to control the accuracy of Pseudo-range measurements. Essentially, the user is given a false Pseudo-range for each satellite so that the resulting measurement is in error by a controlled amount.

Differential GPS is a means by which the civil user can overcome Selective Availability. It requires a receiver be located at a precisely known point from which Pseudo-range corrections for each satellite can be determined and monitored. These Pseudo-range corrections are then communicated by means of a telecommunications link to users at unknown locations. The Differential GPS technique has proven to be particularly effective and can improve the accuracy figure to 3 metres or better with or without Selective Availability activated. In the relative mode, most of the important systematic errors common to the known station and at the unknown location cancel out to improve the accuracy of the computed position.

4.4 SKYFIX/SKYFIX SPOT DIFFERENTIAL LINK

Racal Survey Australia Limited introduced its SkyFix Differential GPS System in Australia in February 1991, using the Inmarsat Pacific and Indian Ocean marine communications satellites as the differential data broadcast link. Extensive performance trials and projects undertaken to date have shown SkyFix to meet the best industry expectations in terms of quality of service and accuracy.

Satellite communications systems, particularly at the Inmarsat L-band frequencies of 1.5 GHz are reliable and free of the interference associated with the crowded MF/HF bands. This high data integrity gives users confidence that the corrections will be continuously received without interference.

The SkyFix Australian network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Sydney, Cairns and Darwin.

The SkyFix Spot Differential GPS System was launched in Australia in October 1994, using the OPTUS high powered focused communications satellite as the differential data broadcast link. Extensive performance trials and projects undertaken to date have shown SkyFix Spot to meet the industry expectations in terms of quality of service and accuracy.

The SkyFix Spot system has a link capacity of 1200 bits per second, similar to the SkyFix system but because it is only transmitting corrections from the Australian network an update rate of better than two seconds is achieved.

The OPTUS satellite uses the L-band frequencies of 1.5586 GHz and are very reliable and free of interference avoiding data loss associated with the crowded HF/MF bands.

The SkyFix Spot network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Cairns, Darwin in addition to Ujung Pandang and Jakarta in Indonesia, and Auckland, New Zealand.

The differential corrections generated at each reference station are brought via landline links, to the data hub and control centre in Singapore; where the system is monitored for performance and quality. From there, a composite message containing full RTCM 104 version 2 formatted data from all reference stations is sent via dual redundant links to Satellite Earth Stations at Sentosa Island, Singapore, O.T.C. Perth, and the earth station at Lockridge, Perth, Western Australia, for uplink and broadcast over the Inmarsat Pacific and Indian Ocean Region satellites and OPTUS satellite.

The SkyFix/SkyFix Spot system includes a 24 hour monitoring facility to ensure the validity of data received at the control centre from the DGPS reference stations, and that the same data are received over the SkyFix/SkyFix Spot satellite data links.

4.5 TRIMBLE 4000DS GPS RECEIVER

The Trimble 4000DS GPS receiver is designed for moderate precision static and dynamic positioning applications. The GPS receiver provides time and three-dimensional station co-ordinates at a once-per-second update rate.

The receiver receives the civilian coded signal (C/A) from the GPS NAVSTAR satellites. The receiver automatically acquires and simultaneously tracks GPS satellites and precisely measures carrier and code phase and computes position and velocity.

Latitude, longitude and height values are output on the World Geodetic System (WGS 84) Earth-centred, Earth-fixed co-ordinate system.

The receiver is designed to measure the following observables:

- Coarse/Acquisition (C/A) code Pseudo-ranges
- Rate of change of Pseudo-range
- Integrated Carrier

C/A code correlation techniques measure the propagation time of the signal from the satellite to the antenna. Latitude, longitude, height and time can be determined from measurements made from at least 4 satellites, by a process similar to triangulation.

To determine speed and heading, the receiver calculates the rate of change of Range (the range-rate) by measuring the Doppler shift of the carrier.

It is capable of receiving and processing differential corrections from other reference sources using the standard format of the Radio Technical Commission for Maritime Services, Special Committee 104 (RTCM sc.-104), Version 1.0 or 2.0 protocols.

The 4000DS has several options available, including internal data logging memory, event marker logging etc. and therefore may be used alone or as part of a more extensive navigation system.
crisis

5. GYRO CALIBRATION

The Racal S.G. Brown 1000S Gyro Compass was calibrated by observing the drill ship heading relative to the azimuth of the sun at 1658 on 24 May 1998. The ship's marine sextant was used for observations. A C-O of –2.26° was calculated. Only two readings were obtainable in rough seas and heavy cloud cover.

The Gyro Compass was calibrated by sextant observations of the sun azimuth at 0727 on 25 May 1998. The C-O calculated as –2.6°. The gyro compass was again checked at 1529 on 26 May 1998 using a Wild T2 Theodolite. The C-O calculated as –2.5°. This value was input to the navigation system during the final fix of position at White Ibis-1.

Regular observations of the ship's Sperry gyrocompass were compared with the Racal navigation gyrocompass. The C-O correction on the Sperry was observed to be approximately –0.2°.

See Appendix C for observations.

6. FINAL RIG POSITION

6.1 FINAL DIFFERENTIAL GPS POSITION

The Northern Explorer III was positioned over the White Ibis-1 location on 1 June 1998.

The Differential GPS final fix of the Northern Explorer III was computed using the SkyFix Spot Differential GPS. Differential GPS corrections from the SkyFix reference stations in Melbourne and Adelaide were utilised in the solution. Between 1840 and 2000 on 1 June 1998, 406 sample positions at 10 second intervals were observed from 11 constellations. The computation of the final fix assigned equal weights to the positions computed for each constellation.

Constellation	Samples	Satellites
A	111	02,07,15,26,27,09,04
B	107	02,07,26,27,09,04
C	26	02,07,05,26,27,09,04
D	57	02,07,05,26,09,04
E	13	02,07,05,26,24,09,04
F	3	02,07,05,26,24,09,04,08
G	1	02,07,05,26,24,09,04
H	40	02,07,05,26,24,09,04,08
I	6	02,07,26,24,09,04,08
J	11	02,07,05,26,24,09,04,08
K	31	07,05,26,24,09,04,08

Total number of samples used = 406

The computed antenna position was as follows:

Datum WGS 84

Latitude	:	39° 57' 44.263" South	(S.D. 0.17m)
Longitude	:	145° 15' 19.621" East	(S.D. 0.08m)
Spheroidal Height	:	17.73m	(S.D. 0.19m)

Transforming the above WGS 84 co-ordinates to AGD 84 using the parameters in section 3, gives the following co-ordinates:

Datum AGD 84

Latitude	:	39° 57' 49.641" South
Longitude	:	145° 15' 14.716" East
Spheroidal Height	:	34.39m

Applying the antenna to drillstem offsets, the following drillstem co-ordinates were computed:

Datum AGD 84

Latitude	:	39° 57' 49.607" South
Longitude	:	145° 15' 17.234" East

AMG Zone 55 C.M. 147° East

Easting : 350 945.86m
Northing : 5 574 789.15m

This position is 1.15 metres on a bearing of 278.73° (True) from the intended White Ibis-1 location.

6.2 POSITIONING OF ANCHORS

Anchor positions were obtained using the Northern Explorer III Selesmar ARPA radar. The position of the stern roller of the anchor handling tug was fixed by True bearing and distance from the ship's radar mast or the winch positions. The radar mast and winch offsets relative to the drill string (datum position) had been measured to derive co-ordinates of the mast and winches at each position fix. The bearing and distance from the respective winch position to anchors 5 and 8 was measured using the Electronic Bearing Line (EBL) on the ARPA.

The anchor positions of 2, 5, 6, 7 and 8 were derived from a fix on the tug stern roller when lowering of the anchor commenced.

The tug positions for 3, 4 and 1 were obtained when the anchor had been placed on the bottom. The anchor chain lengths on 3, 4 and 1 are greater than the 1267 metres of chain/wire which was reportedly available. This is due to the length of pennant wire used.

6.3 WAVE RIDER BUOY LOCATION

The wave rider buoy location as obtained from the Pacific Commander on 30 May 1998 using non Differential GPS is as follows:

Datum AGD 84

Latitude : 39° 50.84' South
Longitude : 145° 47.90' East

AMG Zone 55 C.M. 147° East

Easting : 397 196m
Northing : 5 588 493m

The buoy was not moved from the original position adjacent to the Yolla-2 well. The radio link to the rig was maintained when the rig moved to the White Ibis-1 location.

7. PERSONNEL AND EQUIPMENT

7.1 PERSONNEL

The following personnel were employed on this project:

For : Racal Survey Australia Limited

J. Tighe	:	Surveyor
P. Ananth	:	Engineer

For : Premier Oil Australia Pty Limited

I. Scorgie	:	Client Representative

7.2 EQUIPMENT

The following equipment was provided for this project:

2 x Trimble 4000DS GPS Receivers, Cables and Antennae

1 x SkyFix Demodulator/Decoder

1 x Racal Mini Rig Portable

1 x Compaq Laptop (for GRREP)

1 x Compaq VDU (for Grrep)

1 x Compaq Computer (for MultiFix)

1 x Compaq Computer (for GNS)

1 x Compaq Computer (spare)

1 x S.G. Brown 1000 Gyro

2 x HP Thinkjet Printers

2 x SkyFix Spot Receivers

2 x SkyFix Spot Antennae

2 x SkyFix Spot Downconverters

1 x Wild T2 Theodolite & Tripod

1 x Line Power Conditioner

3 x 24V PSU

plus all associated software:

GNS PC software version GNS416A
MultiFix 2 Multiple Reference Station GPS Software Version 2.09
GRREP software version 416

c/w cables, consumables etc.

8. DISTRIBUTION

Copies of this report have been distributed as follows:

Premier Oil Australia Pty Limited	: 2 copies
Attn: Stuart Harrison	: 1 disk
Racal Survey - Perth	: 1 copy

John Tighe
Surveyor

Anthony Kerr
Area Surveyor

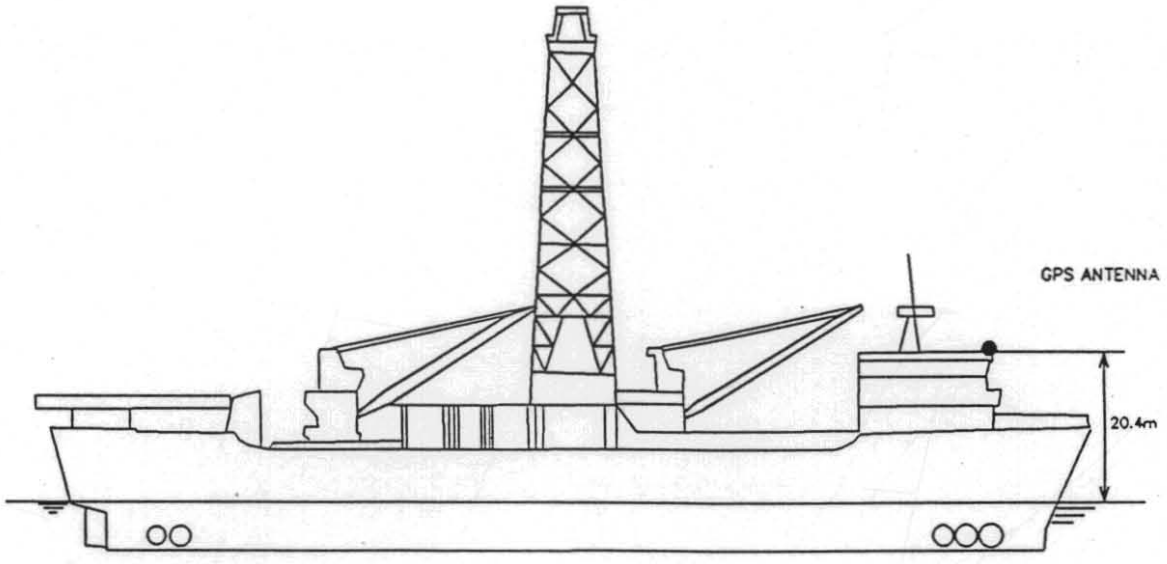
570303

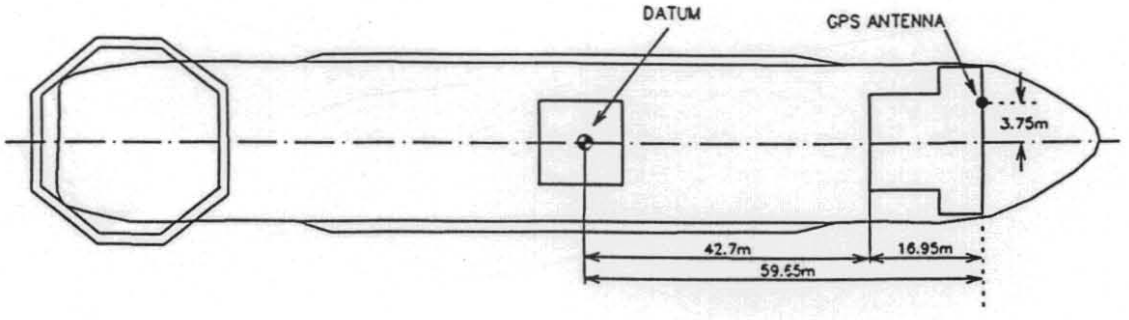
APPENDIX A

OFFSET DIAGRAM - NORTHERN EXPLORER III

570304

VESSEL DIAGRAM





NORTHERN EXPLORER III

(NOT TO SCALE)

570305

APPENDIX B

GNS SYSTEM SET-UP PARAMETERS

570306

SYSTEM DATA
WHITE IBIS-1

GNS416 System Data 30 May 1998 13:53:30

Job Number : 2767A3
Description : White Ibis-1 ✓
Client : Premier Oil Australia
Surveyor : John Tighe / Prem Ananth

Spheroid : ANS

Eccentricity ^2 = 0.006694542
Semi-major axis = 6378160.000 Metres

Projection : UTM/TM

Grid Scale Const = 0.9996000 ✓
Unit Conv. Factor = 1.0000000 ✓
False Easting = 500000.00 Metres ✓
False Northing = 10000000.00 Metres ✓
Central Meridian = 147 DEG 00 MIN 00.000 SEC E ✓
Lat of Origin = 00 DEG 00 MIN 00.000 SEC ✓

System Type Definition

A ONAUN
B Trimble
C Not Defined
D Not Defined

Station Data for System Type A : ONAUN
GPS Spheroid : WGS 84

Eccentricity ^2 = .00669438 ✓
Semi-major axis = 6378137.00 metres ✓

Transformation Parameters to : ANS Spheroid

DX = +116.000 Metres ✓
DY = +50.470 Metres ✓
DZ = -141.690 Metres ✓
Rotation (X) = +.2300 seconds ✓
Rotation (Y) = +.3900 seconds ✓
Rotation (Z) = +.3440 seconds ✓
Scaling (ppm) = -.0983 ✓

Station Data for System Type B : Trimble
GPS Spheroid : WGS 84

Eccentricity ^2 = .00669438
Semi-major axis = 6378137.00 metres

Transformation Parameters to : ANS Spheroid

DX = +116.000 Metres
DY = +50.470 Metres
DZ = -141.690 Metres
Rotation (X) = +.2300 seconds
Rotation (Y) = +.3900 seconds
Rotation (Z) = +.3440 seconds
Scaling (ppm) = -.0983

Station Data for System Type C : Not Defined
No Station Data

Station Data for System Type D : Not Defined
No Station Data

Pattern Corrections and Standard Deviations

System A ONAUN
C-D Corrections :-
Latit. +0.000 Secs
Long. +0.000 Secs
Height +0.000 M

System B Trimble
C-D Corrections :-
Latit. +0.000 Secs
Long. +0.000 Secs
Height +0.000 M

System C Not Defined
No Data

Pattern Corrections and Standard Deviations

System D Not Defined
No Data

1/6

Mobile system assignments

570307

Sys	Mobile	System Type	Status
1	N. Explorer	DNAUN	ON
2	N. Explorer	Trimble	ON

Receiver Pattern Codes

Sys 1 N. Explorer
DNAUN
Receiver1
ON
Geogs 1

Sys 2 N. Explorer
Trimble
Receiver1
ON
Geogs 1

Computation Pattern Codes

Comp 1 N. Explorer
(ON)[TRACKING]

LOP	Patt Code	SRC	HRB
1	Geogs	111	1

Comp 2 N. Explorer
(ON)

LOP	Patt Code	SRC	HRB
1	Geogs	211	1

S=System R=Receiver C=Channel *=Pattern temporarily not used in computation

Antennae/Transducer/Beacon/Target Offsets

System 1 DNAUN
for N. Explorer
Receiver 1

X ✓	Y ✓	Height ✓
-3.75	+59.65	+20.40

Receiver 2

X	Y	Height
+0.00	+0.00	+0.00

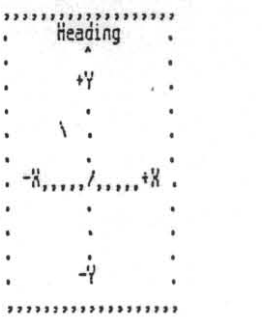


System 2 Trimble
for N. Explorer
Receiver 1

X	Y	Height
-3.75	+59.65	+20.40

Receiver 2

X	Y	Height
+0.00	+0.00	+0.00



Offset 1=\ Offset 2=/

	Winch Offsets (X,Y)			Tow Points (X,Y)		Tow Vessel
F1	-3.9	+71.0	✓	+0.0	+0.0	OFF
F2	-1.4	+73.0	✓	+0.0	+0.0	OFF
	+0.0	+0.0		+0.0	+0.0	OFF
	+0.0	+0.0		+0.0	+0.0	OFF
	+0.0	+0.0		+0.0	+0.0	OFF
	+0.0	+0.0		+0.0	+0.0	OFF
F7	-2.2	-76.0	✓			
F8	-5.3	-76.0	✓			
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
F3	+1.4	+73.0	✓			
F4	+3.9	+71.0	✓			
F5	+5.3	-76.0	✓			
F6	+2.2	-76.0	✓			
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				
	+0.0	+0.0				

2.16

570308

Laser System

Laser 1 : Not Selected Laser 2 : Not Selected

Receiver Interface Addresses

N. Explorer:-	N. Explorer:-
Sys 1 ONAVN	Sys 2 Trimble
Rx 1 : 3201 P	Rx 1 : 3202

P = Prioritised Receiver : 1 seconds.

Peripheral Interface Addresses

Inputs	Outputs	
GOLF 1	Link to TUGNAV	
GOLF 2	Link to GRREP	3209
Time Sync	Shell QC Output	
	C-O Output	
	Nav. Echo	
	Grid Position	
	Mobile Position	
	UIS System	
	KP Output	
	Ulvertech Scanner	
	Pseudo Nav String	
	PEP-CTD Output	
	Shot Controller	
	Skyfix Gyro $ECHDI	
	KP to NeSA PROC	
	Norcon Telegrams	
	Pirelli Kp Out	

Comms Configuration

Digiboard 1: Addresses 3201 - 3208

Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
3201	9600	8	NONE	1	10	0
3202	9600	8	NONE	1	10	0
3203	9600	8	NONE	1	10	0
3204	9600	8	NONE	1	10	0
3205	9600	8	NONE	1	10	0
3206	9600	8	NONE	1	10	0
3207	9600	8	NONE	1	10	0
3208	9600	8	NONE	1	10	0

Digiboard 2: Addresses 3301 - 3308

Not Interfaced

Digiboard 3: Addresses 3401 - 3408

Not Interfaced

Digiboard 4: Addresses 3501 - 3508

Not Interfaced

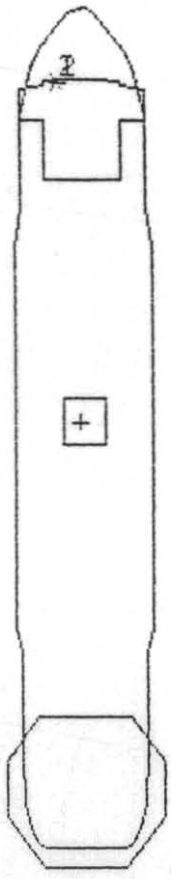
Comms Ports 1 and 2 : Addresses 9 and 11

Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
9	9600	8	NONE	1	10	0
11	Not Present					

570309

Shape Definition: N. Explorer

Antennae Positions
1=Sys1,Recvr1
2=Sys2,Recvr1



Scale: ⌐ = 10 grid units

CURRENT OFFSET Posn : DATUM
+0.00 X, +0.00 Y

5 cm

Waypoint Co-ordinates:

1	White Ibis-1	E	350947.00	N	5574789.00 ✓
2	YOLLA-2	E	398271.48	N	5587154.23

Track Guidance Line Data:

Line	Description	KP SOL	SOL East,North	EOL East,North
1	Yolla-Ibis	0.000	396282.00, 5587136.00	350947.00, 5574789.00

Anchor Co-ordinates (Intended): HEADING 265°

Main Anchors:-				First Backup:-			Second Backup:-		
Anc#	Description	Easting	Northing	Anc#	Description	Easting Northing	Anc#	Description	Easting Northing
P1	P1	350620 ✓	5573822 ✓	P1A		Undefined	P1B		Undefined
P2	P2	350115 ✓	5574144 ✓	P2A		Undefined	P2B		Undefined
P3		Undefined		P3A		Undefined	P3B		Undefined
P4		Undefined		P4A		Undefined	P4B		Undefined
P5		Undefined		P5A		Undefined	P5B		Undefined
P6		Undefined		P6A		Undefined	P6B		Undefined
P7	P7	351881 ✓	5574298 ✓	P7A		Undefined	P7B		Undefined
P8	P8	351442 ✓	5573892 ✓	P8A		Undefined	P8B		Undefined
P9		Undefined		P9A		Undefined	P9B		Undefined
P10		Undefined		P10A		Undefined	P10B		Undefined
P11		Undefined		P11A		Undefined	P11B		Undefined
P12		Undefined		P12A		Undefined	P12B		Undefined
S1		Undefined		S1A		Undefined	S1B		Undefined
S2		Undefined		S2A		Undefined	S2B		Undefined
S3	S3	350016 ✓	5575280 ✓	S3A		Undefined	S3B		Undefined
S4	S4	350457 ✓	5575685 ✓	S4A		Undefined	S4B		Undefined
S5	S5	351279 ✓	5575758 ✓	S5A		Undefined	S5B		Undefined
S6	S6	351782 ✓	5575435 ✓	S6A		Undefined	S6B		Undefined
S7		Undefined		S7A		Undefined	S7B		Undefined
S8		Undefined		S8A		Undefined	S8B		Undefined

4/6

S10	Undefined	S10A	Undefined	S10B	Undefined
S11	Undefined	S11A	Undefined	S11B	Undefined
S12	Undefined	S12A	Undefined	S12B	Undefined

Chart Parameters :-

Nmr	Title	Centre East,North	Skew	Scale	Width	Height
1	Testing	9530250.00E 4453000.00N	0.00	25000	32.00	27.50

Verified by: Ian Scobie (sign) IAN SCOBIE - (print) 30 May 1998 13:56:38

1413 Hrs, 30/5/98.

Online Computations : Spheroid/Datum Transformation

Seven Parameter Shift Values

DX (metres) :	+116.000	Rot X (secs) :	+.2300
DY (metres) :	+50.470	Rot Y (secs) :	+.3900
DZ (metres) :	-141.690	Rot Z (secs) :	+.3440
Scale (ppm) :	-.0983		

Source Spheroid : WGS 84		Destination Spheroid : ANS	
Semi-major:	+6378137.000	Semi-major:	+6378160.000
Eccentr^2 :	+.0066943800	Eccentr^2 :	+.0066945419
Latitude :	39 DEG 57 MIN 49.610 SEC S	Latitude :	39 DEG 57 MIN 54.988 SEC S
Longitude :	145 DEG 15 MIN 17.280 SEC E	Longitude :	145 DEG 15 MIN 12.375 SEC E
Spher. Ht :	+0.000	Spher. Ht :	+16.667
Cart X :	-4022435.149	Cart X :	-4022306.396
Cart Y :	+2789963.426	Cart Y :	+2790015.786
Cart Z :	-4074904.031	Cart Z :	-4075056.037

Online Computations : Spheroid/Datum Transformation

Seven Parameter Shift Values

DX (metres) :	+116.000	Rot X (secs) :	+.2300
DY (metres) :	+50.470	Rot Y (secs) :	+.3900
DZ (metres) :	-141.690	Rot Z (secs) :	+.3440
Scale (ppm) :	-.0983		

Source Spheroid : WGS 84		Destination Spheroid : ANS	
Semi-major:	+6378137.000	Semi-major:	+6378160.000
Eccentr^2 :	+.0066943800	Eccentr^2 :	+.0066945419
Latitude :	39 DEG 57 MIN 44.232 SEC S	Latitude :	39 DEG 57 MIN 49.610 SEC S
Longitude :	145 DEG 15 MIN 22.185 SEC E	Longitude :	145 DEG 15 MIN 17.280 SEC E
Spher. Ht :	+0.000	Spher. Ht :	+16.661
Cart X :	-4022589.037	Cart X :	-4022460.284
Cart Y :	+2789928.488	Cart Y :	+2789980.849
Cart Z :	-4074776.897	Cart Z :	-4074928.903

Online Computations : Geographicals to Grid

Latitude	: 39 DEG 57 MIN 49.610 SEC S	
Longitude	: 145 DEG 15 MIN 17.280 SEC E	
Grid Location	: E 350946.95 N	5574789.08
Convergence	: 1° 7'15.411"	1.1209 degs
Point Scale F.	: .99987352	

5.16

570311

1645 31/5/98 White Ibis-1 1204 metres, 270°

Anchor Co-ordinates (Intended): Hdg 270° final

Main Anchors:-				First Backup:-			Second Backup:-		
Anc#	Description	Easting	Northing	Anc#	Description	Easting Northing	Anc#	Description	Easting Northing
P1	P1	350464 ✓	5573654 ✓	P1A		Undefined	P1B		Undefined
P2	P2	349868 ✓	5574097 ✓	P2A		Undefined	P2B		Undefined
P3		Undefined		P3A		Undefined	P3B		Undefined
P4		Undefined		P4A		Undefined	P4B		Undefined
P5		Undefined		P5A		Undefined	P5B		Undefined
P6		Undefined		P6A		Undefined	P6B		Undefined
P7	P7	352009 ✓	5574096 ✓	P7A		Undefined	P7B		Undefined
P8	P8	351435 ✓	5573652 ✓	P8A		Undefined	P8B		Undefined
P9		Undefined		P9A		Undefined	P9B		Undefined
P10		Undefined		P10A		Undefined	P10B		Undefined
P11		Undefined		P11A		Undefined	P11B		Undefined
P12		Undefined		P12A		Undefined	P12B		Undefined
S1		Undefined		S1A		Undefined	S1B		Undefined
S2		Undefined		S2A		Undefined	S2B		Undefined
S3	S3	349888 ✓	5575481 ✓	S3A		Undefined	S3B		Undefined
S4	S4	350464 ✓	5575924 ✓	S4A		Undefined	S4B		Undefined
S5	S5	351435 ✓	5575926 ✓	S5A		Undefined	S5B		Undefined
S6	S6	352009 ✓	5575482 ✓	S6A		Undefined	S6B		Undefined
S7		Undefined		S7A		Undefined	S7B		Undefined
S8		Undefined		S8A		Undefined	S8B		Undefined
S9		Undefined		S9A		Undefined	S9B		Undefined
S10		Undefined		S10A		Undefined	S10B		Undefined
S11		Undefined		S11A		Undefined	S11B		Undefined
S12		Undefined		S12A		Undefined	S12B		Undefined

Checked. 31/5/98.

6/6

570312

APPENDIX C

GYRO CALIBRATION

570313

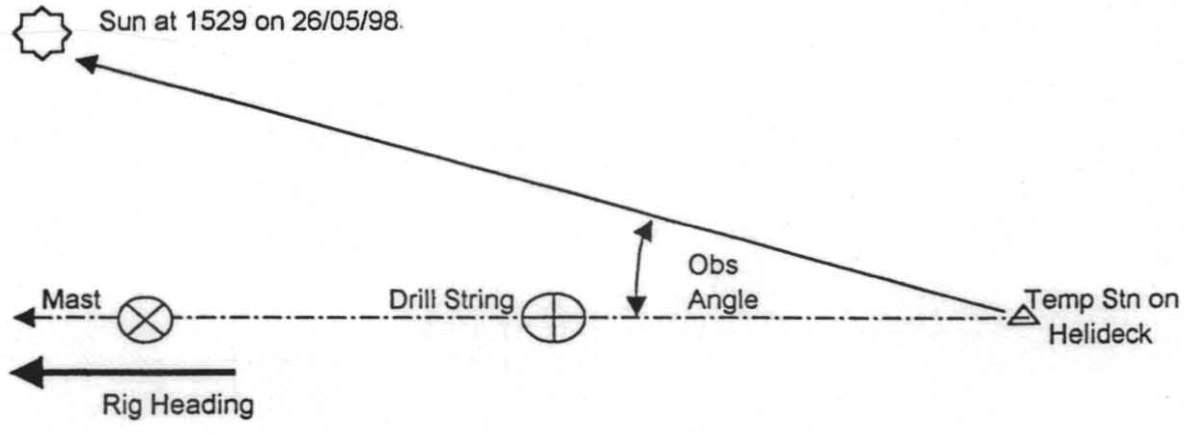
SUNSHOT AZIMUTH - GYRO CALIBRATION

Date: 26-May-98 **Location:** Yolla-2
Job No: 2767A3 **Client:** Premier Oil

Heading (C)=Calculated Heading Latitude: 39 51 28 S
Heading (O)=Gyro Observed Heading Longitude: 145 48 41 E

Local Time	UTC	Sun Az	Angle Sun	Heading (C)	Heading (O)	C-O	Remarks
15:29:00	5:29:00	313.65	50.82	262.83	265.50	-2.67	Obs by theodolite
15:29:00	5:29:00	313.27	49.92	263.35	265.80	-2.45	"
15:29:00	5:29:00	313.08	49.75	263.33	265.80	-2.47	"
15:29:00	5:29:00	312.88	49.43	263.45	265.80	-2.35	"
15:29:00	5:29:00	312.65	49.53	263.12	265.70	-2.58	"

Mean Value **-2.50**



Obs by: JCTighe

Not to Scale

570314

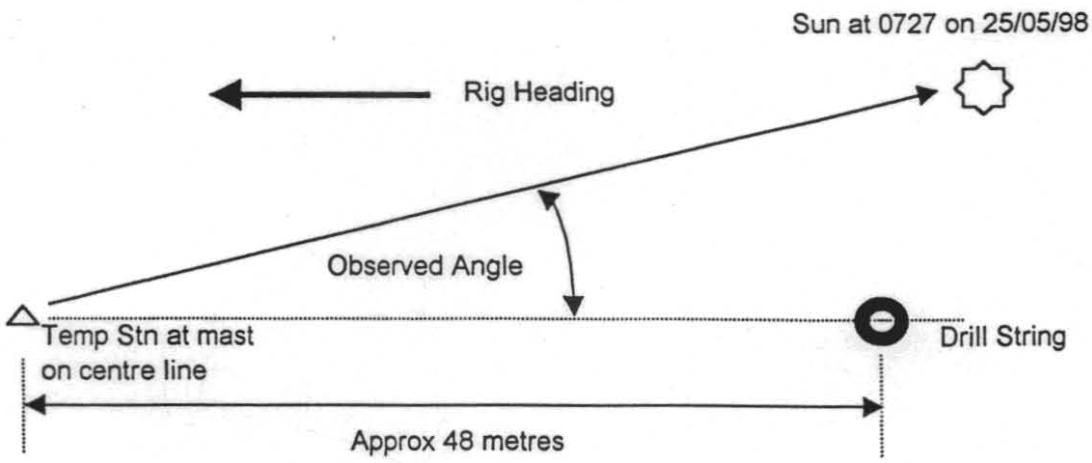
SUNSHOT AZIMUTH - GYRO CALIBRATION

Date: 25-May-98 **Location:** Yolla-2
Job No: 2767A3 **Client:** Premier Oil

Heading (C)=Calculated Heading Latitude: 39 51 28 S
Heading (O)=Gyro Observed Heading Longitude: 145 48 41 E

Local Time	UTC	Sun Az	Angle Sun	Heading (C)	Heading (O)	C-O	Remarks
7:27:00	21:27:00	62.50	20.62	263.12	265.70	-2.58	Obs by sextant
7:27:30	21:27:30	62.42	20.72	263.14	265.70	-2.56	"
7:28:00	21:28:00	62.34	20.97	263.31	266.00	-2.69	"
7:28:30	21:28:30	62.25	20.87	263.12	265.70	-2.58	"
7:29:30	21:29:30	62.09	21.00	263.09	265.60	-2.51	"

Mean Value **-2.58**



Obs by: JCTighe

Not to Scale

570315

APPENDIX D

NAVIGATION CHECK – POSITION FIX AND GRAPHICS PRINTOUTS - YOLLA-2

DGPS check of ...

570316

GNS v R4.6 10:40:23 25 May 1998 to 11:00:13 25 May 1998
GPS Weighting Option - Constellations given equal weights
Mean Corrected Gyro : 263.2 Gyro Correction : -2.6
Mean Grid Heading : 262.4 Convergence : +0.763

Antennae/Transducer/Beacon/Target Offsets

System 1 ONAUN
for N. Explorer
Receiver 1

X	Y	Height
+6.55	+53.90	+20.40

Receiver 2

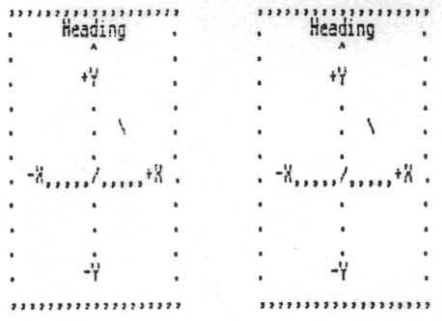
X	Y	Height
+0.00	+0.00	+0.00

System 2 Trimble
for N. Explorer
Receiver 1

X	Y	Height
+6.55	+53.90	+20.40

Receiver 2

X	Y	Height
+0.00	+0.00	+0.00



Offset 1=\ Offset 2=/

N. EXPLORER Computation 1 (ONAUN)

Constellations Used

Const.	# Samples	S.V.s
A	44	14,16,22,15,25,29
B	5	14,16,18,22,15,25,29
C	52	14,16,18,22,15,29

Total number of samples used : 101

Intended Final Datum Location
ANS Spheroid
Latitude : 39 DEG 51 MIN 33.889 SEC S
Longitude : 145 DEG 48 MIN 38.492 SEC E
UTM/TM
Easting : 398271.48 Metres
Northing : 5587154.23 Metres

Computed Final Antenna Position
WGS 84 Spheroid
Latitude : 39 DEG 51 MIN 28.442 SEC S Sd : .15 Metres
Longitude : 145 DEG 48 MIN 41.075 SEC E Sd : .21 Metres
Height : 19.36 Metres Sd : .44 Metres

ANS Spheroid
Latitude : 39 DEG 51 MIN 33.845 SEC S
Longitude : 145 DEG 48 MIN 36.208 SEC E
Height : 34.95 Metres
UTM/TM
Easting : 398217.19 Metres
Northing : 5587154.87 Metres

Computed Final Datum Position
ANS Spheroid
Latitude : 39 DEG 51 MIN 33.848 SEC S
Longitude : 145 DEG 48 MIN 38.493 SEC E
UTM/TM
Easting : 398271.48 Metres
Northing : 5587155.50 Metres

Final Datum Position is 1.27 Metres (spheroidal distance) bearing 000.82 T from the Intended Loc.

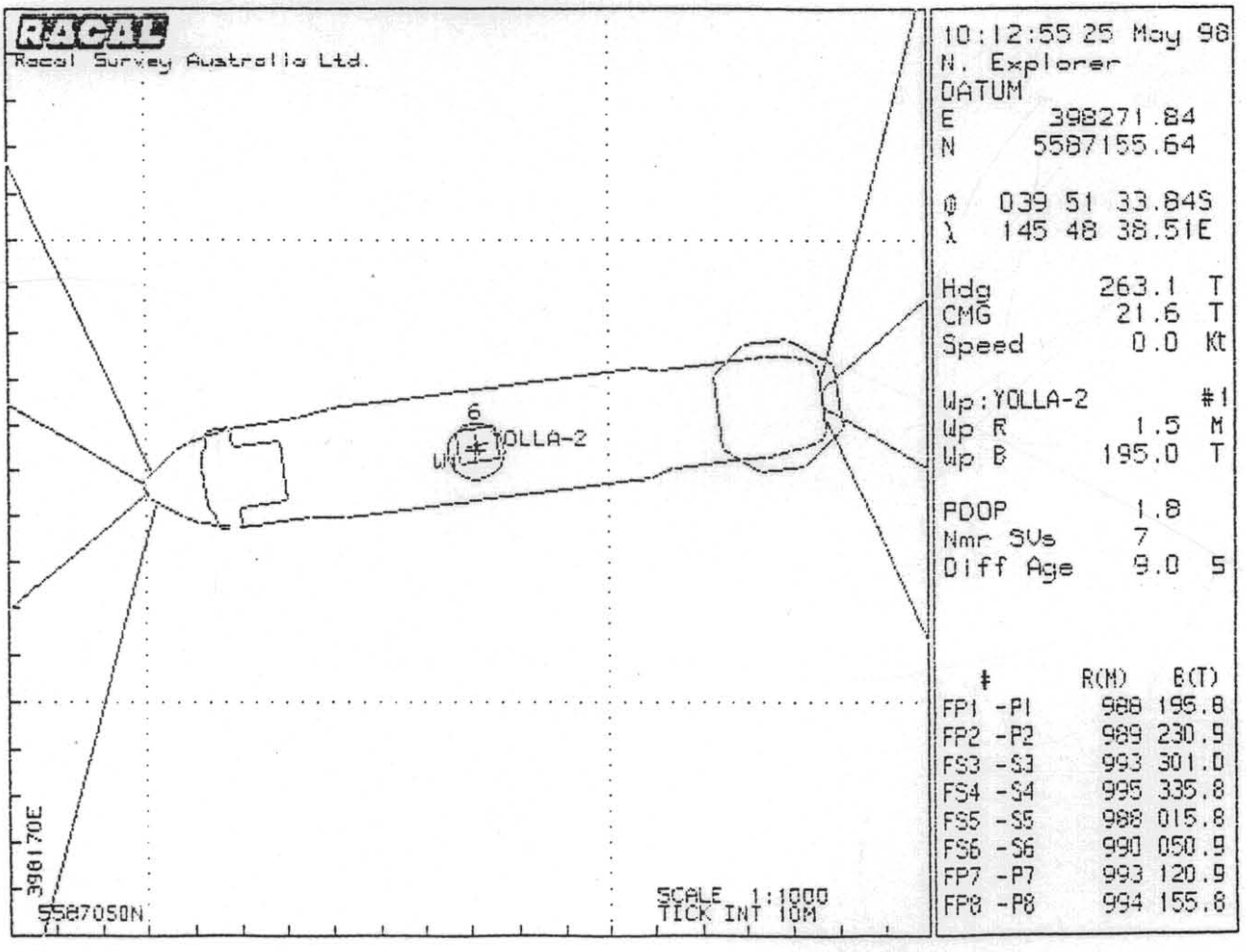
DGPS Check at Yolla-2

570317

```
FIX # 149     10:12:36 25 May 1998 Time Zone +0
N. Explorer  (Last position update 10:12:36)  Logging File :  OFF
        CURRENT OFFSET FROM DATUM :  +0.00 X   +0.00 Y (DATUM)
        DATUM : E   398271.84 N  5587155.24 Ht  +16.69  Lat 39 51 33.856S  Long 145 48 38.508E
         Offset  1 DATUM                 : E   398271.84 N  5587155.24
         Offset  2 FAIRLEAD 1      (Hdg) : E   398199.32 N  5587147.02
         Offset  3 FAIRLEAD 2      (Hdg) : E   398200.90 N  5587149.76
         Offset  4 FAIRLEAD 3      (Hdg) : E   398346.50 N  5587170.50
         Offset  5 FAIRLEAD 4      (Hdg) : E   398346.91 N  5587167.43
         Offset  6 FAIRLEAD 5      (Hdg) : E   398347.49 N  5587163.06
         Offset  7 FAIRLEAD 6      (Hdg) : E   398347.90 N  5587159.99
         Offset  8 FAIRLEAD 7      (Hdg) : E   398201.92 N  5587142.02
         Offset  9 FAIRLEAD 8      (Hdg) : E   398199.69 N  5587144.25
        Speed MG(K):   0.0 Corrected Gyro(T) : 263.2 Corrn. :   -2.6 Cmg(T) :  21.6
        Waypoint: YOLLA-2    Dist(M ):       1.1 Brg(T): 200.5
        COMP 1 DNAVN (Tracking)      DATUM : E  398271.84   N  5587155.24 Ht  +37.09
        C-Os applied :    dLat :   +0.00   dLong :   +0.00   dHeight :   +0.00   Rx spheroid : WGS 84
        25 May 1998  UTC Time :00 12 38.8  CMG :324.0  SMG :000.0
        ANTENNA (WGS 84) Lat : 39 51 28.450 S  Long :145 48 41.090 E   (PR Corr.)  Ht :   21.50 M
        PRNs:C14 SN:18 RE:000 STAT:0IC16 SN:11 RE:001 STAT:0IC22 SN:09 RE:000 STAT:0IC01 SN:07 RE:000 STAT:0I
        C15 SN:15 RE:000 STAT:0IC25 SN:18 RE:000 STAT:0IC29 SN:04 RE:000 STAT:0I
        PDOP :01.8  HDOP :01.1  3D-Err :002  2D-Err :001  Mode :ALL IN VIEW
        COMP 2 Trimble      DATUM : E  398262.40   N  5587143.21 Ht  +24.59   Diff E   -9.44 Diff N  -12.03
        C-Os applied :    dLat :   +0.00   dLong :   +0.00   dHeight :   +0.00   Rx spheroid : WGS 84
        25 May 1998  UTC Time :00:12:36   Course: 324.0   Speed:   0.03
        ANTENNA Lat:  39 51 28.836 S   Long: 145 48 40.686 E   Height:     9.00 M
        PDOP: 01.8   Diff Corrected: NO     SVs:  14,16,22,01,15,25,29
```

Differential

Non differential



5 cm

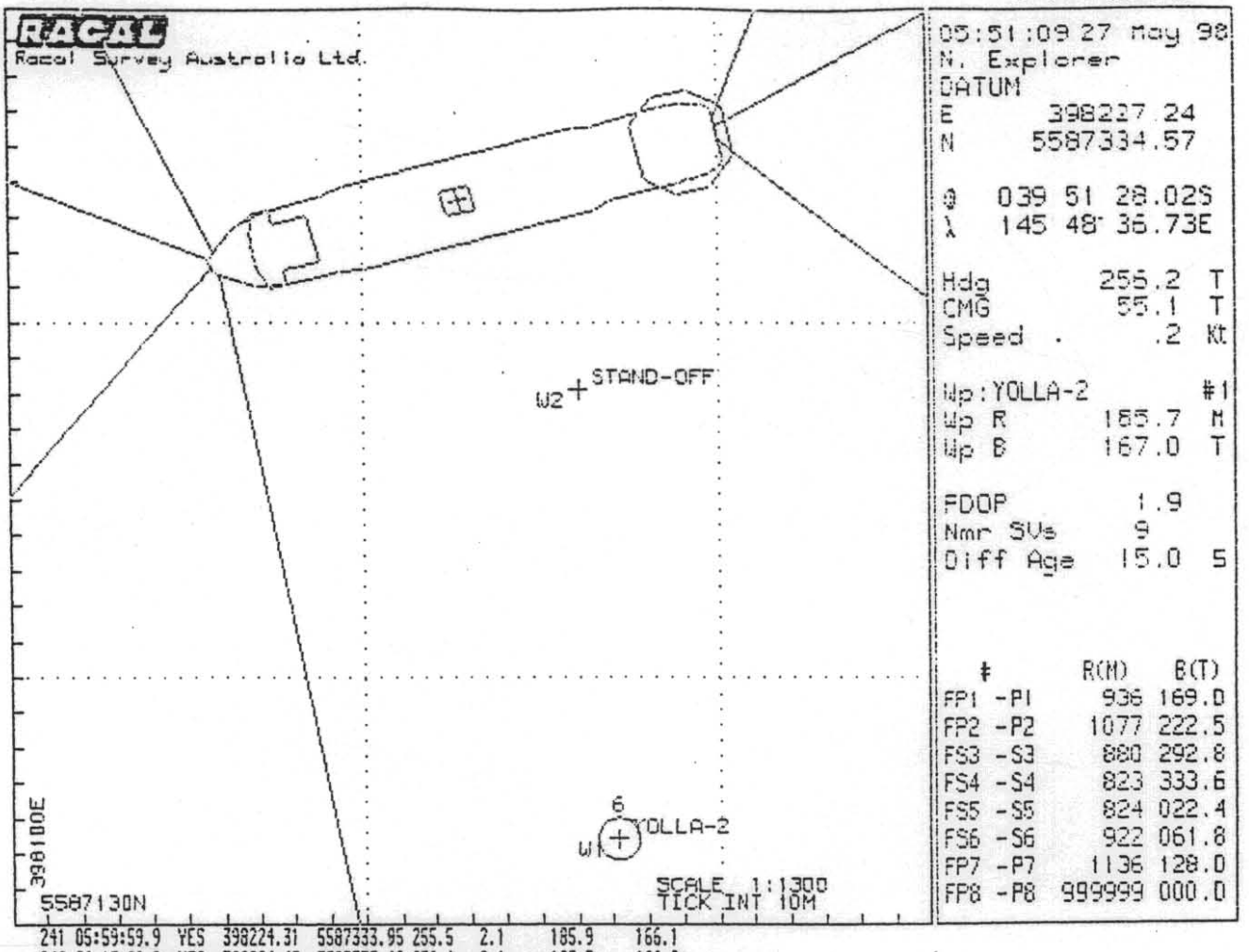
570318

APPENDIX E

GRAPHICS PRINTOUT RIG POSITION AT CASING BLASTS - YOLLA-2

RACAL

570319



05:51:09 27 May 98
N. Explorer
DATUM
E 398227.24
N 5587334.57

φ 039 51 28.02S
λ 145 48 36.73E

Hdg	256.2	T
CMG	55.1	T
Speed	.2	Kt
Wp: YOLLA-2		#1
Wp R	185.7	M
Wp B	167.0	T
FDOP	1.9	
Nmr SVs	9	
Diff Age	15.0	S

#	R(M)	B(T)
FP1 -P1	936	169.0
FP2 -P2	1077	222.5
FS3 -S3	880	292.8
FS4 -S4	823	333.6
FS5 -S5	824	022.4
FS6 -S6	922	061.8
FP7 -P7	1136	128.0
FP8 -P8	999999	000.0

241	05:59:59.9	YES	398224.31	5587333.95	255.5	2.1	185.9	166.1
242	06:15:00.0	YES	398224.43	5587333.42	256.4	2.1	185.3	166.0
243	06:30:00.0	YES	398244.66	5587292.14	258.6	2.0	140.5	169.8
244	06:44:59.9	YES	398244.52	5587266.25	244.6	2.1	115.3	167.2
245	06:59:59.9	YES	398257.86	5587254.56	242.7	2.1	101.3	173.0

5 cm

rel position at casing blast. no. #1

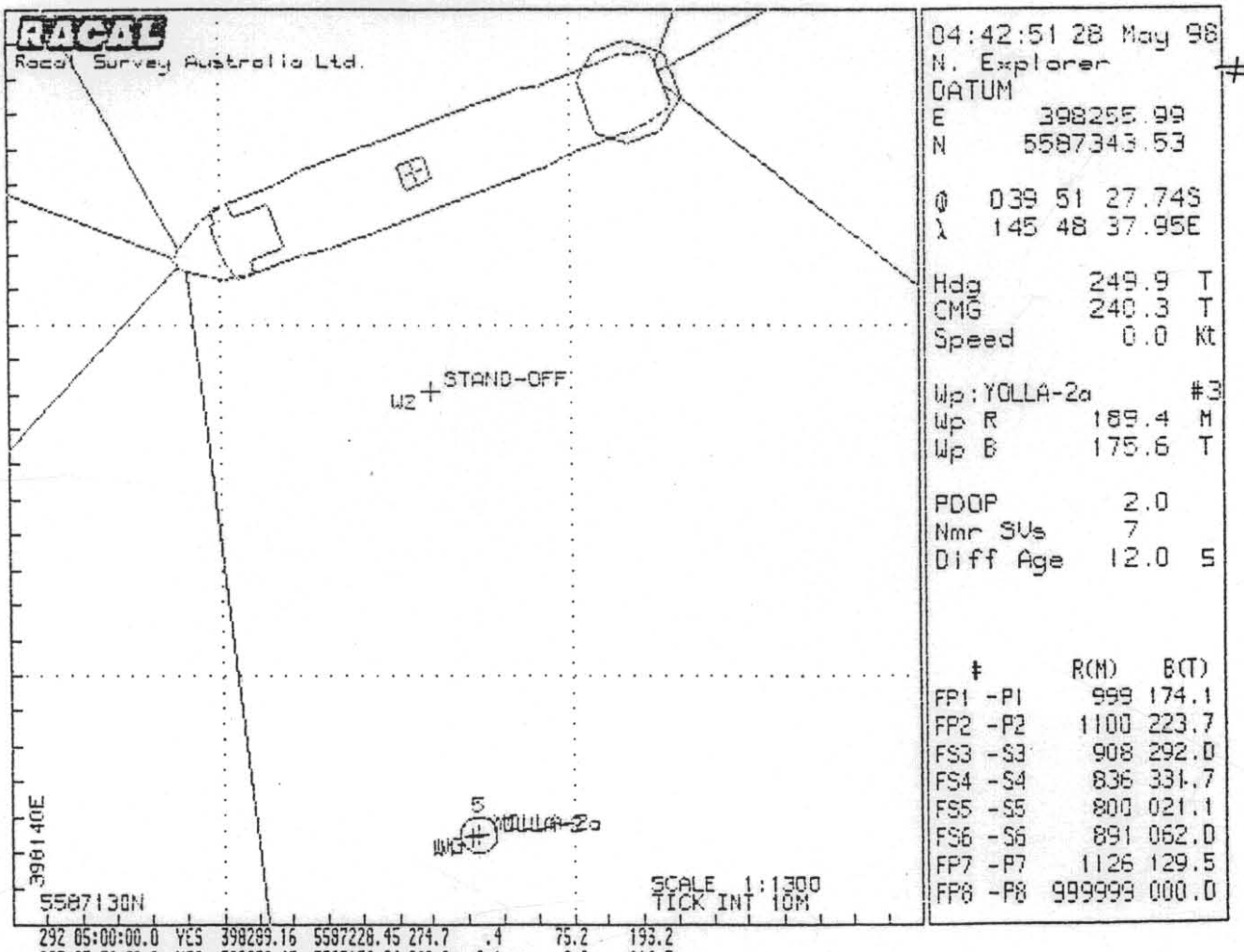
570320

```
Offset  8 FAIRLEAD 7      (Hdg) : E   398302.33 N  5587145.62
Offset  9 FAIRLEAD 8      (Hdg) : E   398200.15 N  5587145.29
Offset 10 MAST            (Hdg) : E   398224.82 N  5587149.41
Speed MG(K):   0.0 Corrected Gyro(T) : 264.5 Corrn. :   -2.5 Cmg(T) : 179.5
Waypoint: YOLLA-2a   Dist(M ):       .6 Brg(T):  53.8
COMP 1 DNAUN (Tracking)      DATUM : E  398272.53   N  5587154.65 Ht  +36.09
C-Os applied :    dLat :   +0.00   dLong :   +0.00   dHeight :   +0.00   Rx spheroid : WGS 84
28 May 1998  UTC Time :17 47 31.5  CMG :028.2  SMG :000.1
ANTENNA (WGS 84) Lat : 39 51 28.780 S  Long :145 48 40.920 E   (PR Corr.)  Ht :   20.50 M
PRNs:E23 SN:07 RE:000 STAT:0 E06 SN:05 RE:000 STAT:0 E21 SN:05 RE:000 STAT:0 E17 SN:07 RE:000 STAT:0
E03 SN:03 RE:000 STAT:0 E22 SN:05 RE:000 STAT:0 E26 SN:04 RE:000 STAT:0
PDOP :02.3  HDOP :01.1  3D-Err :001  2D-Err :000  Mode :ALL IN VIEW
COMP 2 Trimble       DATUM : E  398305.22   N  5587162.42 Ht  +25.59   Diff E  +32.69 Diff N   +7.77
C-Os applied :    dLat :   +0.00   dLong :   +0.00   dHeight :   +0.00   Rx spheroid : WGS 84
28 May 1998  UTC Time :17:47:28   Course:  28.2   Speed:   0.06
ANTENNA Lat:  39 51 28.542 S   Long: 145 48 42.300 E   Height:   10.00 M
PDOP: 02.3   Diff Corrected: NO      SVs:  23,06,21,17,03,22,26
```

FixNmr	Time	Log	Datum E,N		Hdg(T)	DOP	Wpt BTOG	Wpt BTOG
291	03:59:59.9	YES	398272.43	5587156.08	264.0	2.2	1.2	152.9

RIG AT STAND OFF FOR CASING BLAST

NC #2



292	05:00:00.0	YES	398289.16	5587228.45	274.7	.4	75.2	193.2
293	05:59:59.9	YES	398270.45	5587156.24	260.2	2.1	2.8	116.7
294	06:59:59.9	YES	398271.11	5587156.45	260.0	2.0	2.4	128.3
295	08:00:00.0	YES	398271.62	5587155.43	260.1	3.5	1.4	108.2

5 cm

Mobile System Assignments

Sys	Mobile	System Type	Status
1	N. Explorer	DNAUN	ON
2	N. Explorer	Trimble	ON

Computation Pattern Codes

Comp 1 N. Explorer (ON)

LOP	Patt Code	SRC	HRB
1	Geogs	111	1

Comp 2 N. Explorer (ON)

LOP	Patt Code	SRC	HRB
1	Geogs	211	1

S=System R=Receiver C=Channel *=Pattern temporarily not used in computation

296	08:59:59.9	YES	398270.92	5587156.25	260.2	3.9	2.4	121.7

Mobile System Assignments

570321

APPENDIX F

DGPS DRILLSTEM POSITION FIX PRINTOUT - WHITE IBIS-1

RACAL

570322

FINAL/STATIC POSITION ANALYSIS: White Ibis-1
GNS v R416 18:40:24 1 Jun 1998 to 20:00:03 1 Jun 1998
GPS Weighting Option - Constellations given equal weights
Mean Corrected Gyro : 272.6 Gyro Correction : -2.5
Mean Grid Heading : 271.5 Convergence : +1.121

Antennae/Transducer/Beacon/Target Offsets

System 1 DNAUN
for N. Explorer
Receiver 1

X	Y	Height
-3.75	+59.65	+20.40

Receiver 2

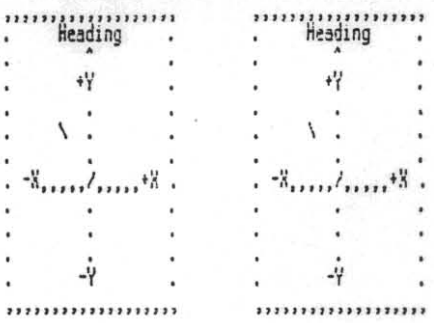
X	Y	Height
+0.00	+0.00	+0.00

System 2 Trimble
for N. Explorer
Receiver 1

X	Y	Height
-3.75	+59.65	+20.40

Receiver 2

X	Y	Height
+0.00	+0.00	+0.00



Offset 1=\ Offset 2=/

N. EXPLORER Computation 1 (DNAUN)

Constellations Used

Const.	# Samples	S.V.s
A	111	02,07,15,26,27,09,04
B	107	02,07,26,27,09,04
C	26	02,07,05,26,27,09,04
D	57	02,07,05,26,09,04
E	13	02,07,05,26,24,09,04
F	3	02,07,05,26,24,09,04,08
G	1	02,07,05,26,24,09,04
H	40	02,07,05,26,24,09,04,08
I	6	07,05,26,24,09,04,08
J	11	02,07,05,26,24,09,04,08
K	31	07,05,26,24,09,04,08

Total number of samples used : 406

Intended Final Datum Location
ANS Spheroid
Latitude : 39 DEG 57 MIN 49.613 SEC S
Longitude : 145 DEG 15 MIN 17.282 SEC E
UTM/TM
Easting : 350947.00 Metres
Northing : 5574789.00 Metres

Computed Final Antenna Position
WGS 84 Spheroid
Latitude : 39 DEG 57 MIN 44.263 SEC S Sd : .17 Metres
Longitude : 145 DEG 15 MIN 19.621 SEC E Sd : .08 Metres
Height : 17.73 Metres Sd : .19 Metres

ANS Spheroid
Latitude : 39 DEG 57 MIN 49.641 SEC S
Longitude : 145 DEG 15 MIN 14.716 SEC E
Height : 34.39 Metres
UTM/TM
Easting : 350886.13 Metres
Northing : 5574786.93 Metres

Computed Final Datum Position
ANS Spheroid
Latitude : 39 DEG 57 MIN 49.607 SEC S
Longitude : 145 DEG 15 MIN 17.234 SEC E
UTM/TM
Easting : 350945.86 Metres
Northing : 5574789.15 Metres

Final Datum Position is 1.15 Metres (spheroidal distance) bearing 278.73 T from the Intended Loc.

570323

FINAL POSITION ANALYSIS: White Ibis-1
WGS 84 Spheroid
GNS v R 4i6

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position A Constellation:(02,07,15,26,27,09,04)
18:40:24 1 Jun 1998 to 19:00:03 1 Jun 1998
No samples: 111 1 to 111
No samples used: Lat/Long 111 Height 111
P.D.O.P Minimum 1.7 Maximum 1.9
H.D.O.P Minimum .9 Maximum 1.0
3D error Minimun 2.0m Maximum 3.0m
2D error Minimun 1.0m Maximum 2.0m
Latitude 39 DEG 57 MIN 44.251 SEC S (S.D. .72m)
Longitude 145 DEG 15 MIN 19.610 SEC E (S.D. .28m)
Height 19.57 m (S.D. .61m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position B Constellation:(02,07,26,27,09,04)
19:00:45 1 Jun 1998 to 19:19:22 1 Jun 1998
No samples: 107 112 to 218
No samples used: Lat/Long 107 Height 107
P.D.O.P Minimum 2.7 Maximum 3.3
H.D.O.P Minimum 1.3 Maximum 1.5
3D error Minimun 2.0m Maximum 4.0m
2D error Minimun 1.0m Maximum 2.0m
Latitude 39 DEG 57 MIN 44.280 SEC S (S.D. .67m)
Longitude 145 DEG 15 MIN 19.614 SEC E (S.D. .29m)
Height 17.82 m (S.D. 1.18m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position C Constellation:(02,07,05,26,27,09,04)
19:20:03 1 Jun 1998 to 19:24:29 1 Jun 1998
No samples: 26 219 to 244
No samples used: Lat/Long 26 Height 26
P.D.O.P Minimum 2.4 Maximum 2.5
H.D.O.P Minimum 1.2 Maximum 1.2
3D error Minimun 3.0m Maximum 3.0m
2D error Minimun 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.283 SEC S (S.D. .63m)
Longitude 145 DEG 15 MIN 19.622 SEC E (S.D. .21m)
Height 16.10 m (S.D. .43m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position D Constellation:(02,07,05,26,09,04)
19:25:10 1 Jun 1998 to 19:35:05 1 Jun 1998
No samples: 57 245 to 301
No samples used: Lat/Long 57 Height 57
P.D.O.P Minimum 3.0 Maximum 3.1
H.D.O.P Minimum 1.3 Maximum 1.3
3D error Minimun 3.0m Maximum 4.0m
2D error Minimun 1.0m Maximum 2.0m
Latitude 39 DEG 57 MIN 44.271 SEC S (S.D. .53m)
Longitude 145 DEG 15 MIN 19.626 SEC E (S.D. .21m)
Height 16.50 m (S.D. .79m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position E Constellation:(02,07,05,26,24,09,04)
19:35:46 1 Jun 1998 to 19:39:02 1 Jun 1998
No samples: 13 302 to 314
No samples used: Lat/Long 13 Height 13
P.D.O.P Minimum 2.9 Maximum 2.9
H.D.O.P Minimum 1.2 Maximum 1.2
3D error Minimun 3.0m Maximum 3.0m
2D error Minimun 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.268 SEC S (S.D. .74m)
Longitude 145 DEG 15 MIN 19.636 SEC E (S.D. .28m)
Height 16.45 m (S.D. .82m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position F Constellation:(02,07,05,26,24,09,04,08)
19:40:22 1 Jun 1998 to 19:40:42 1 Jun 1998
No samples: 3 315 to 317
No samples used: Lat/Long 3 Height 3
P.D.O.P Minimum 2.2 Maximum 2.2
H.D.O.P Minimum 1.0 Maximum 1.0
3D error Minimun 3.0m Maximum 3.0m
2D error Minimun 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.257 SEC S (S.D. .47m)
Longitude 145 DEG 15 MIN 19.613 SEC E (S.D. .14m)
Height 17.90 m (S.D. .26m)

570324

No samples: 1 318 to 318
No samples used: Lat/Long 1 Height 1
P.D.O.P Minimum 2.9 Maximum 2.9
H.D.O.P Minimum 1.2 Maximum 1.2
3D error Minimum 3.0m Maximum 3.0m
2D error Minimum 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.270 SEC S (S.D. 0.00m)
Longitude 145 DEG 15 MIN 19.610 SEC E (S.D. 0.00m)
Height 18.00 m (S.D. 0.00m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position H Constellation:(02,07,05,26,24,09,04,08)
19:42:05 1 Jun 1998 to 19:49:36 1 Jun 1998
No samples: 40 319 to 358
No samples used: Lat/Long 40 Height 40
P.D.O.P Minimum 2.3 Maximum 2.3
H.D.O.P Minimum 1.0 Maximum 1.0
3D error Minimum 2.0m Maximum 3.0m
2D error Minimum 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.252 SEC S (S.D. .50m)
Longitude 145 DEG 15 MIN 19.616 SEC E (S.D. .24m)
Height 18.33 m (S.D. .48m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position I Constellation:(07,05,26,24,09,04,08)
19:50:18 1 Jun 1998 to 19:51:14 1 Jun 1998
No samples: 6 359 to 364
No samples used: Lat/Long 6 Height 6
P.D.O.P Minimum 2.9 Maximum 2.9
H.D.O.P Minimum 1.3 Maximum 1.3
3D error Minimum 3.0m Maximum 3.0m
2D error Minimum 1.0m Maximum 2.0m
Latitude 39 DEG 57 MIN 44.257 SEC S (S.D. .37m)
Longitude 145 DEG 15 MIN 19.637 SEC E (S.D. .36m)
Height 17.60 m (S.D. .25m)

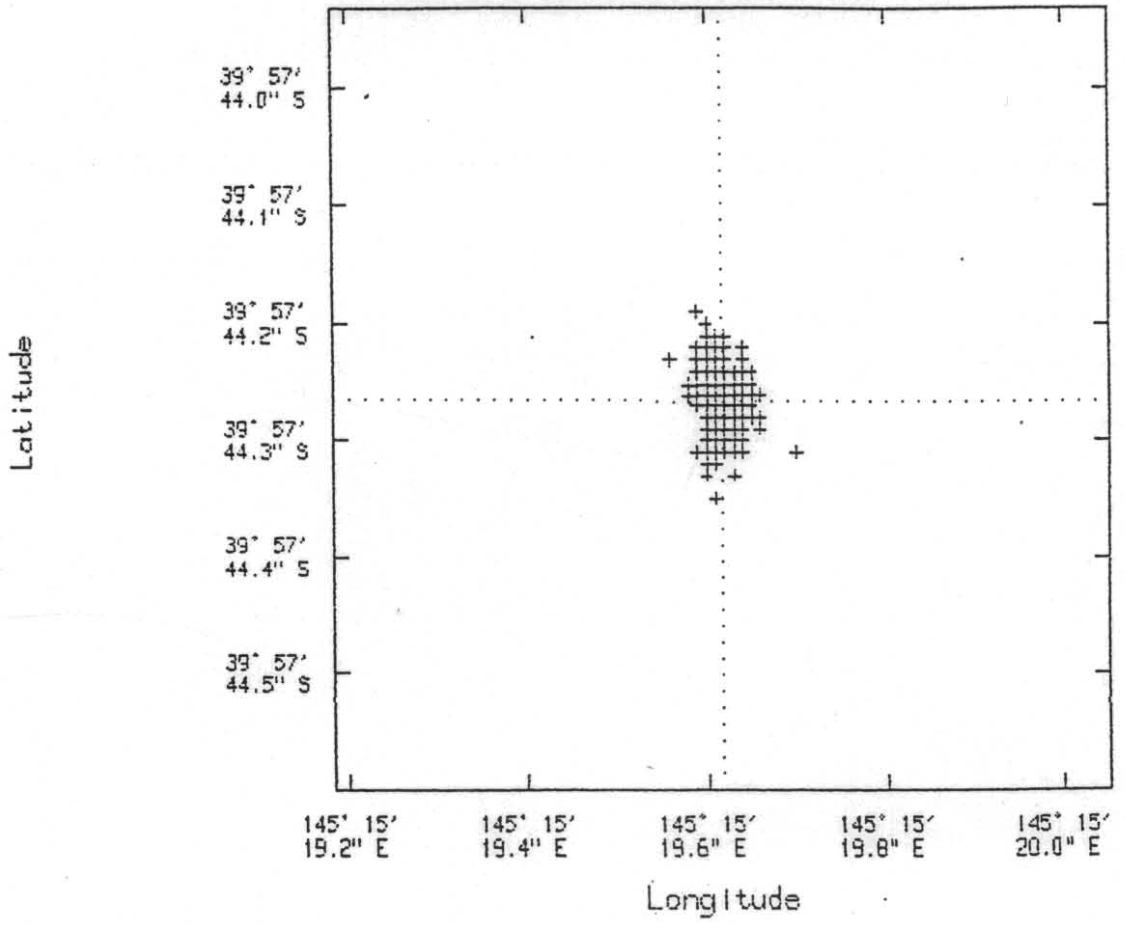
COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position J Constellation:(02,07,05,26,24,09,04,08)
19:51:55 1 Jun 1998 to 19:54:03 1 Jun 1998
No samples: 11 365 to 375
No samples used: Lat/Long 11 Height 11
P.D.O.P Minimum 2.3 Maximum 2.3
H.D.O.P Minimum 1.0 Maximum 1.0
3D error Minimum 2.0m Maximum 2.0m
2D error Minimum 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.245 SEC S (S.D. .56m)
Longitude 145 DEG 15 MIN 19.602 SEC E (S.D. .26m)
Height 19.25 m (S.D. .60m)

COMPUTATION 1 CONSTELLATION SUB FINAL POSITION - DNAVN
Sub-final Position K Constellation:(07,05,26,24,09,04,08)
19:54:45 1 Jun 1998 to 20:00:03 1 Jun 1998
No samples: 31 376 to 406
No samples used: Lat/Long 31 Height 31
P.D.O.P Minimum 2.9 Maximum 3.0
H.D.O.P Minimum 1.3 Maximum 1.3
3D error Minimum 3.0m Maximum 3.0m
2D error Minimum 1.0m Maximum 1.0m
Latitude 39 DEG 57 MIN 44.262 SEC S (S.D. .68m)
Longitude 145 DEG 15 MIN 19.640 SEC E (S.D. .37m)
Height 17.54 m (S.D. .61m)

Analysis data stored to file ANAL2
Analysis data stored to file ANAL2

570925

Computation 1 GPS Scatter Plot (DNAUN)

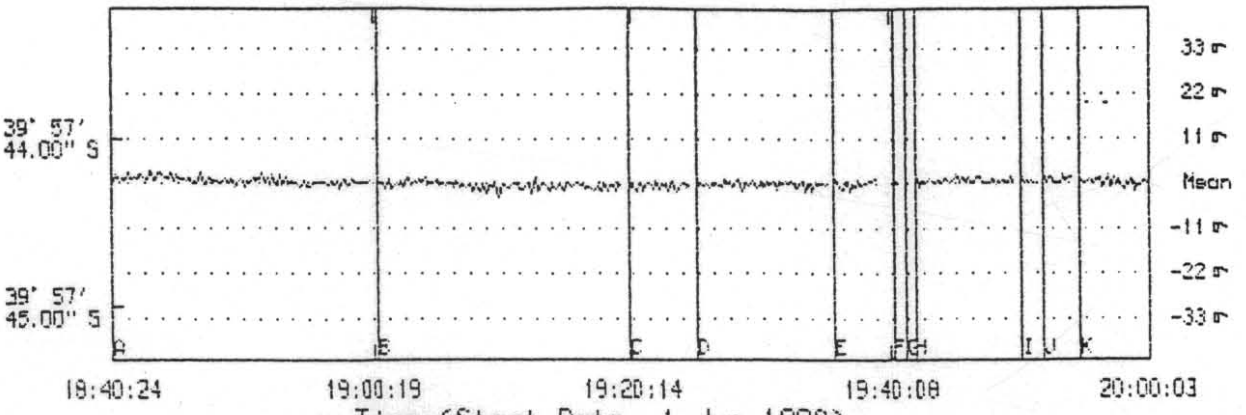


Centred on mean antenna position (passes 1 to 406).
WGS 84 Spheroid
Latitude 39 DEG 57 MIN 44.265 SEC S
Longitude 145 DEG 15 MIN 19.618 SEC E

5 cm

570326

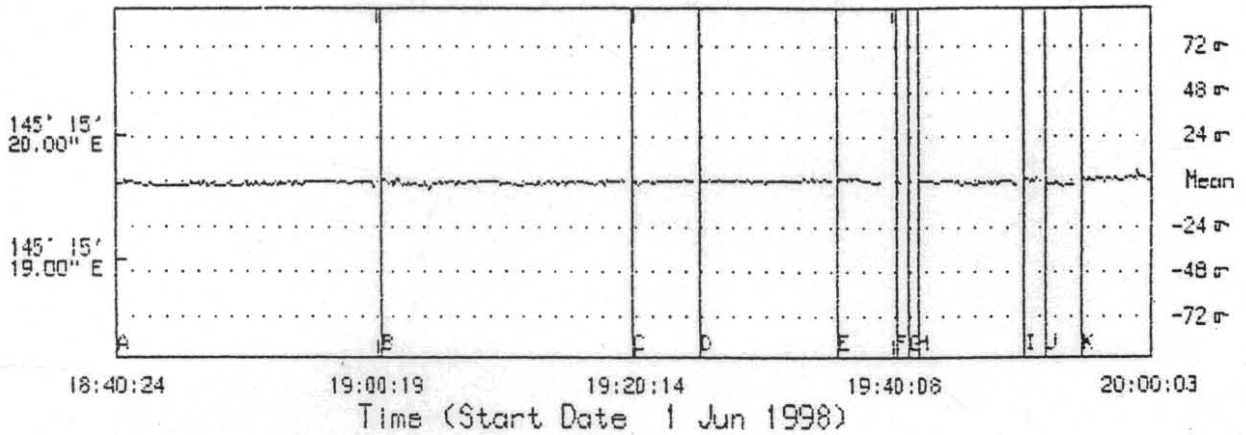
Computation 1 GPS Latitude (DNAUN)



18:40:24 19:00:19 19:20:14 19:40:08 20:00:03

Time (Start Date 1 Jun 1998)

Computation 1 GPS Longitude (DNAVN)



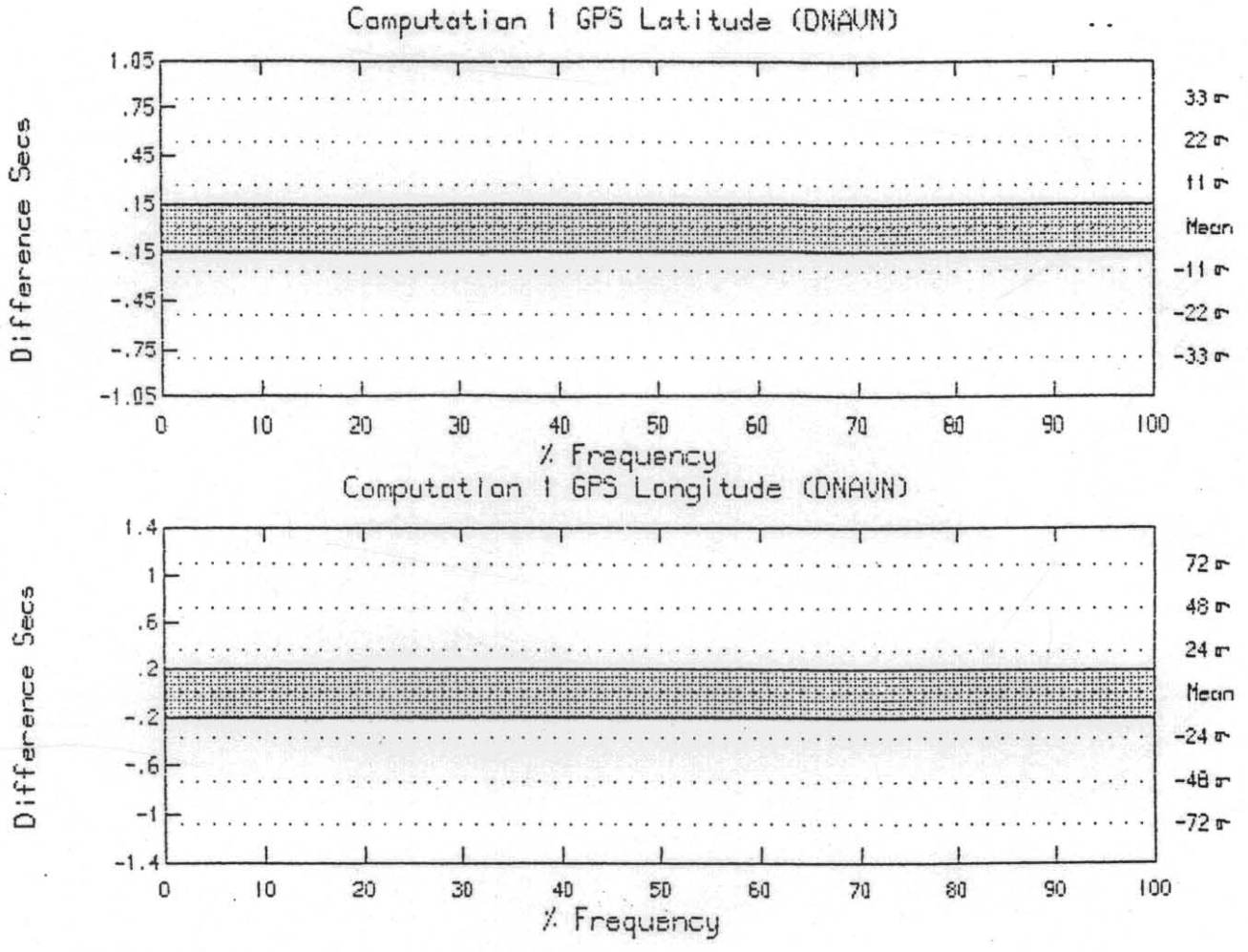
18:40:24 19:00:19 19:20:14 19:40:08 20:00:03

Time (Start Date 1 Jun 1998)

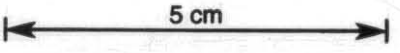
Computation 1 (WGS 84 - DNAVN)
Centred on mean of antenna position (passes 1 to 406).
Latitude 39 DEG 57 MIN 44.265 SEC S Sd .752 Metres
Longitude 145 DEG 15 MIN 19.618 SEC E Sd .357 Metres

5 cm

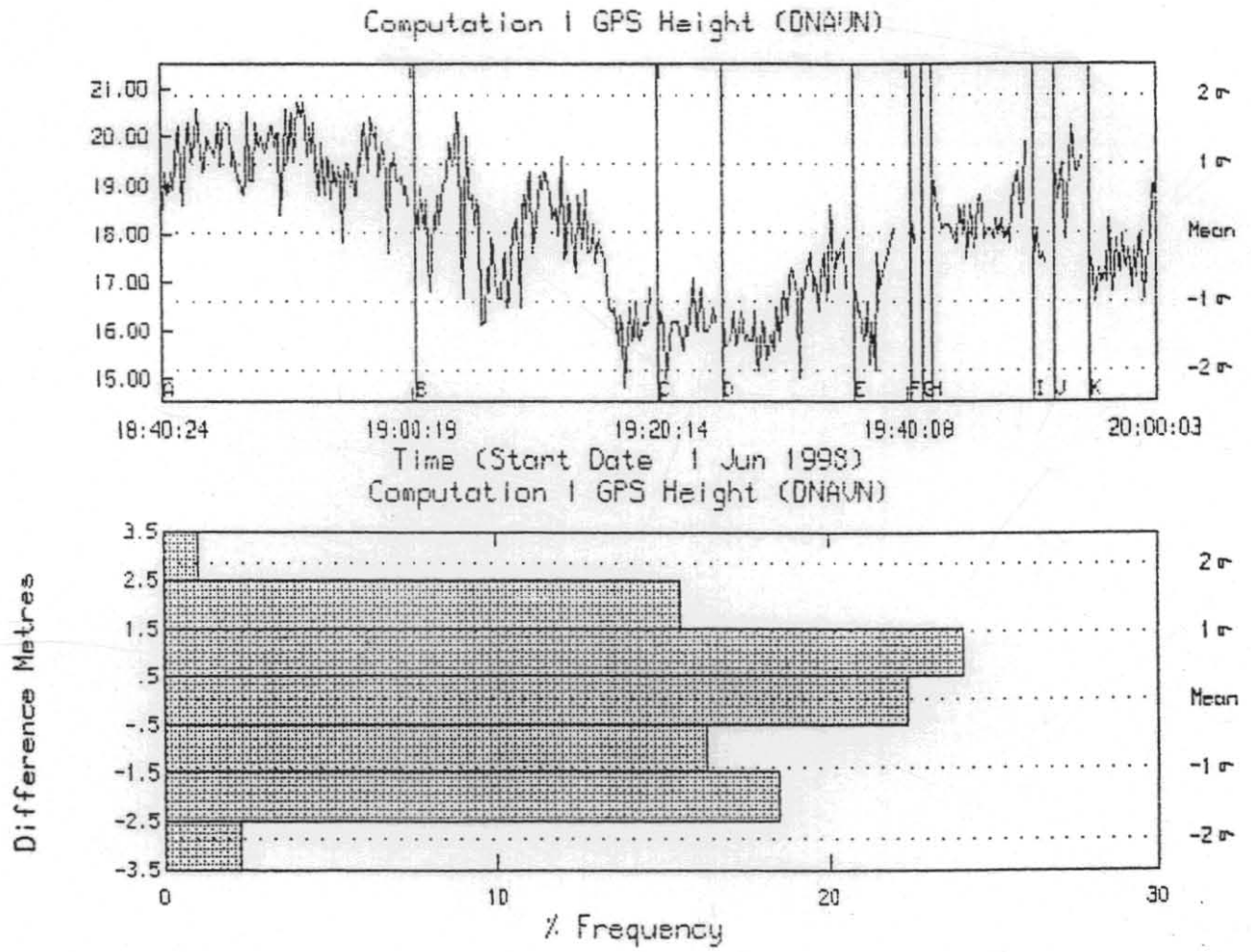
570327



Computation 1 (WGS 84 - DNAUN)
Centred on mean of antenna position (passes 1 to 406).
Latitude 39 DEG 57 MIN 44.265 SEC S Sd .752 Metres
Longitude 145 DEG 15 MIN 19.618 SEC E Sd .357 Metres



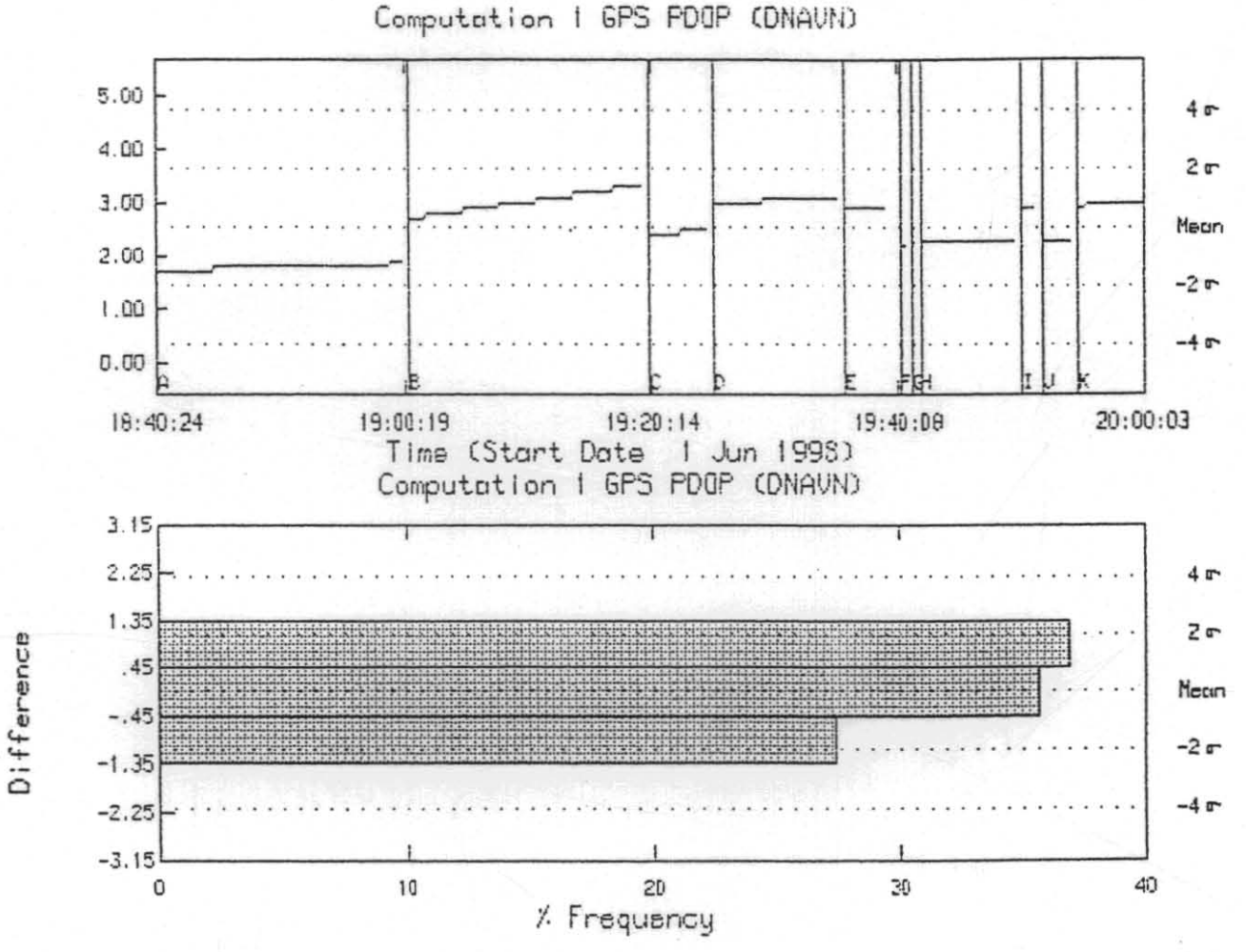
570328



Computation 1 (WGS 84 - DNAVN)
Centred on mean of antenna position (passes 1 to 406).
Height +18.02 Sd 1.422 Metres

5 cm

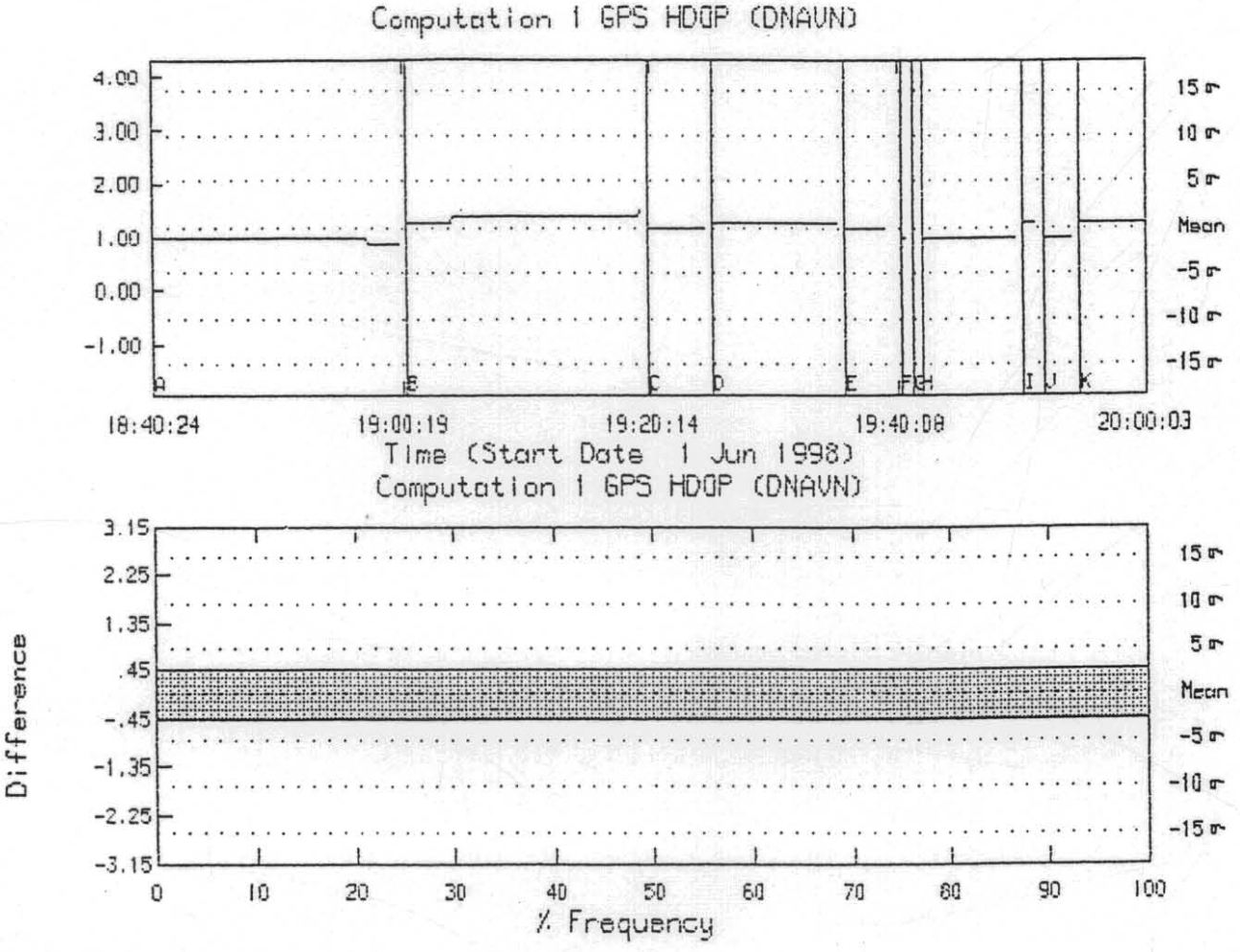
570329



Computation 1 (WGS 84 - DNAVN)
Centred on mean of antenna position (passes 1 to 406).
PDOP 2.5 Sd .544

5 cm

570330



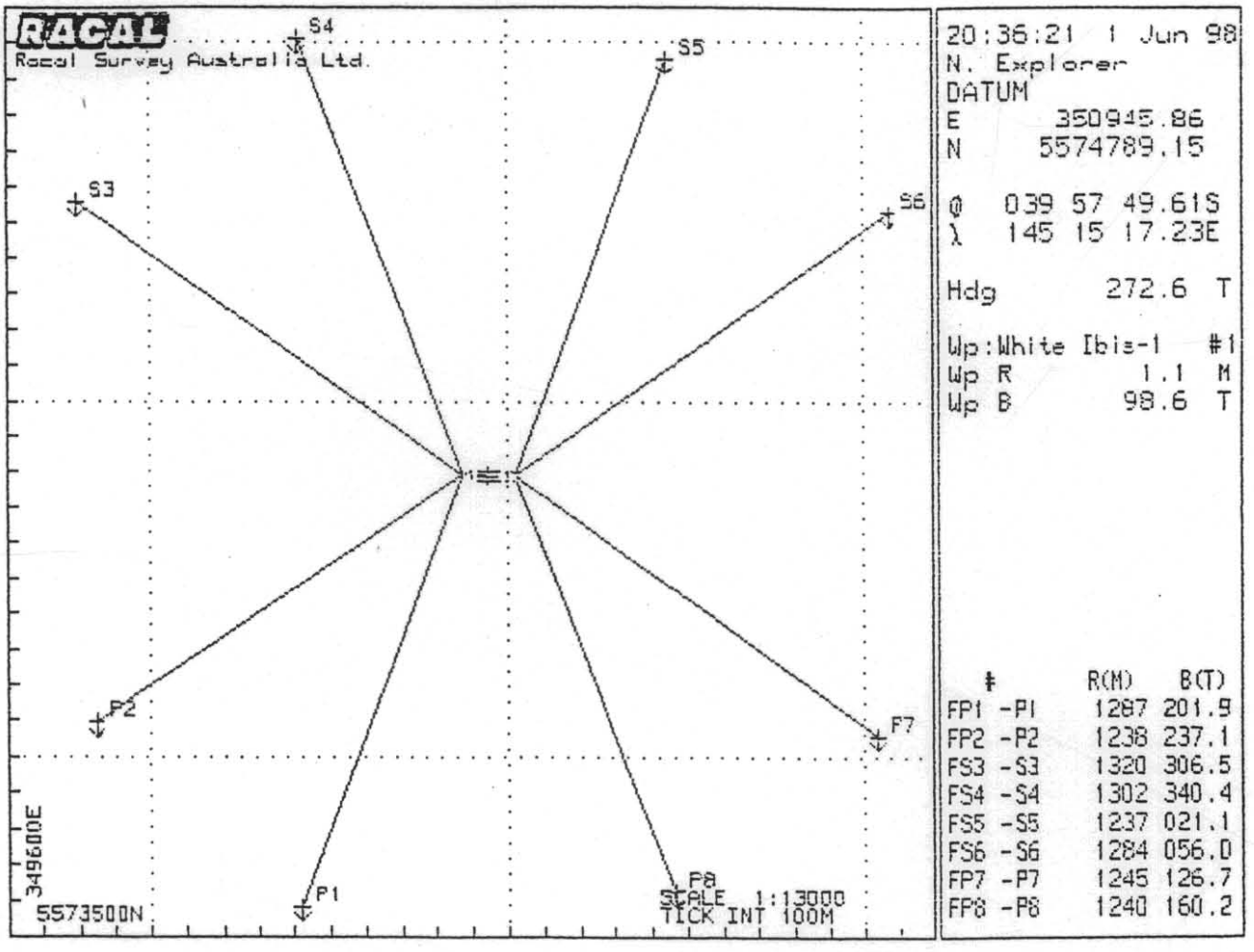
Computation 1 (WGS 84 - DNAVN)
Centred on mean of antenna position (passes 1 to 406).
HDOP 1.2 Sd .171

5 cm

570331

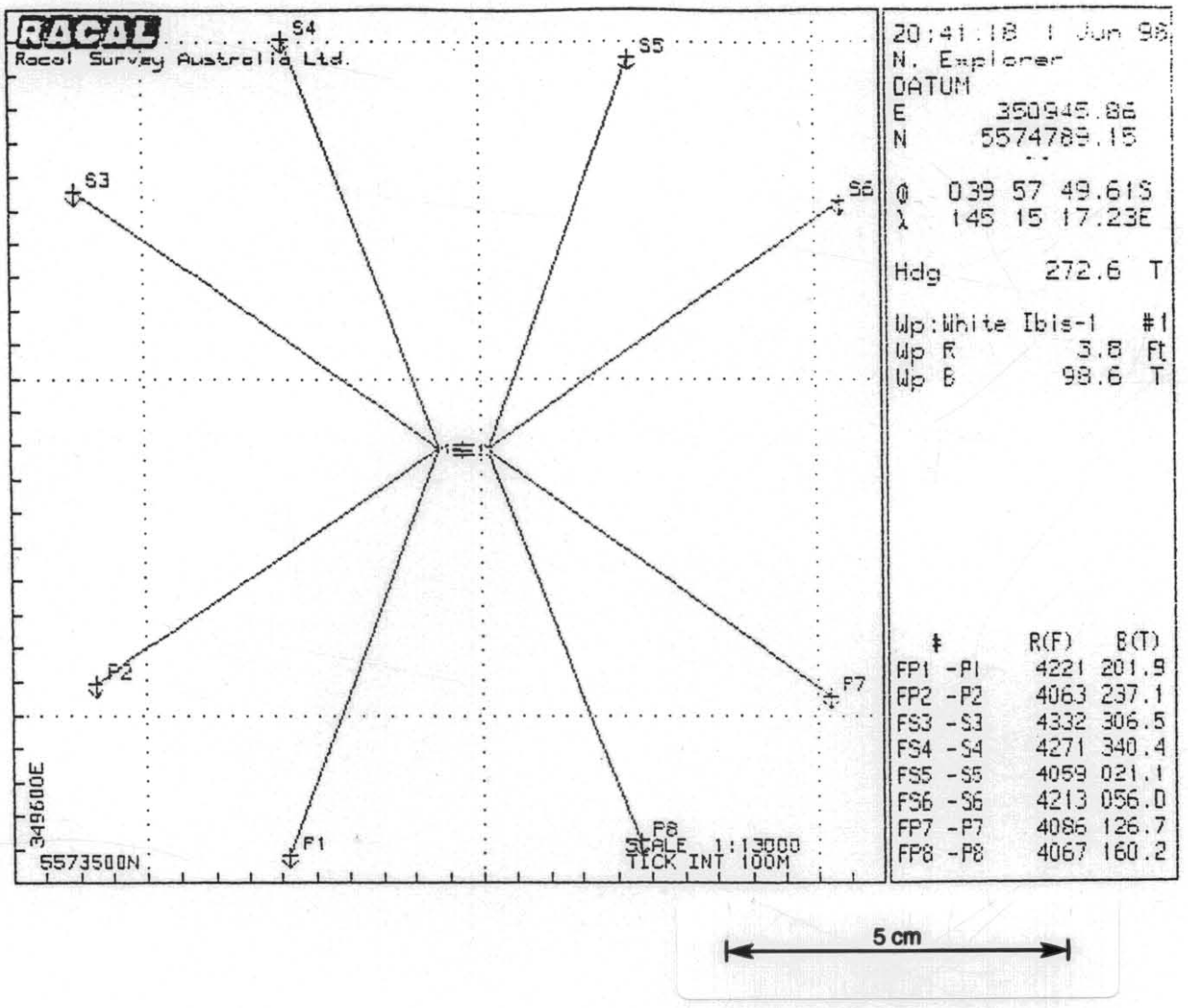
APPENDIX G

GNS GRAPHICS PRINTOUT - WHITE IBIS-1

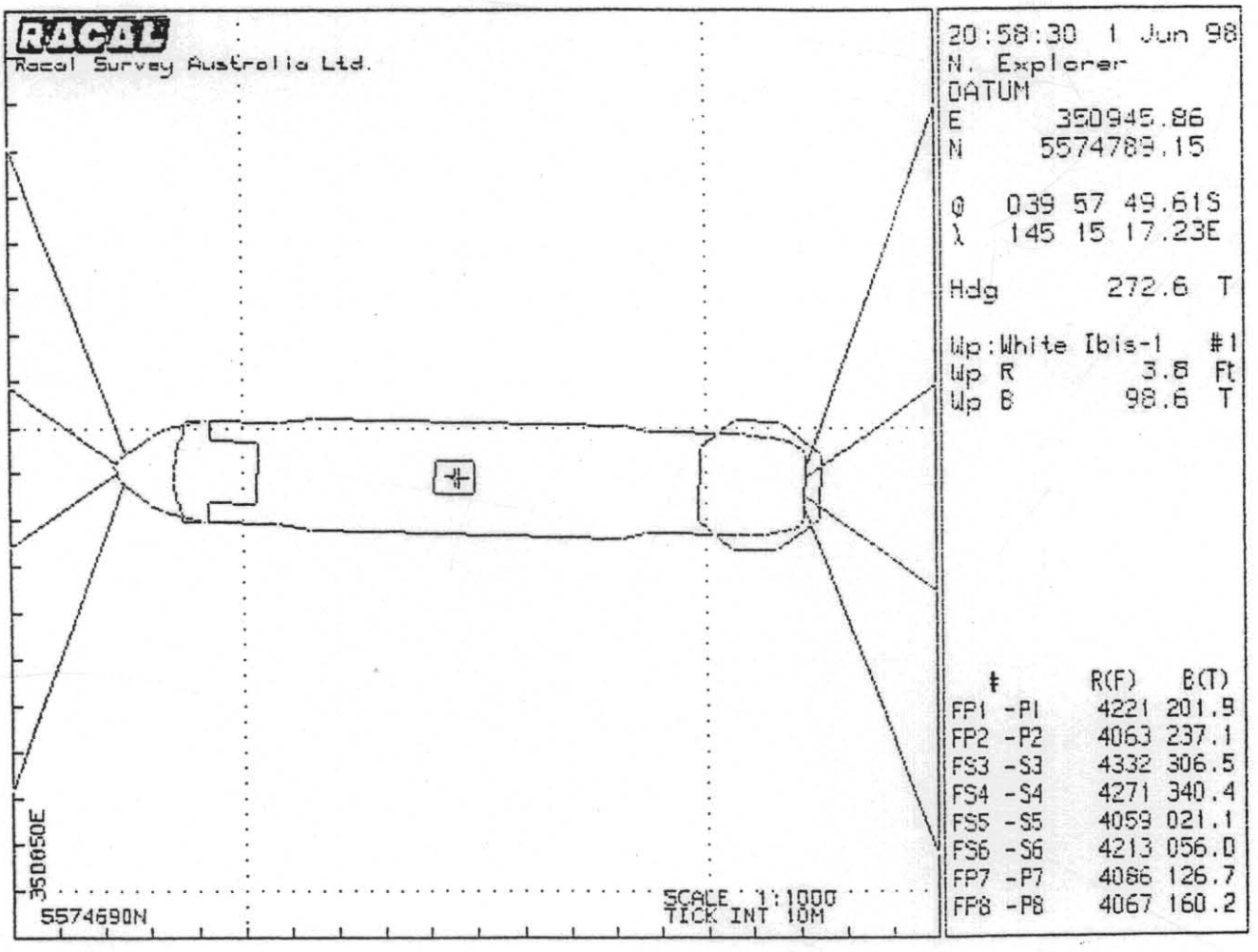

RACAL
Racal Survey Australia Ltd.
S4
S5
S3
S6
P2
F7
P1
P8
349600E
5573500N
SCALE 1:13000
TICK INT 100M
20:36:21 1 Jun 98
N. Explorer
DATUM
E 350945.86
N 5574789.15
@ 039 57 49.61S
λ 145 15 17.23E
Hdg 272.6 T
Wp:White Ibis-1 #1
Wp R 1.1 M
Wp B 98.6 T
R(M) B(T)
FP1 -P1 1287 201.9
FP2 -P2 1238 237.1
FS3 -S3 1320 306.5
FS4 -S4 1302 340.4
FS5 -S5 1237 021.1
FS6 -S6 1284 056.0
FP7 -P7 1245 126.7
FP8 -P8 1240 160.2

5 cm

570333


RACAL
Racal Survey Australia Ltd.
S4
S5
S3
S6
P2
F7
F1
P8
349600E
5573500N
SCALE 1:13000
TICK INT 100M
20:41:18 1 Jun 96
N. Explorer
DATUM
E 350945.86
N 5574789.15
@ 039 57 49.61S
λ 145 15 17.23E
Hdg 272.6 T
Wp:White Ibis-1 #1
Wp R 3.8 Ft
Wp B 98.6 T
R(F) B(T)
FP1 -P1 4221 201.9
FP2 -P2 4063 237.1
FS3 -S3 4332 306.5
FS4 -S4 4271 340.4
FS5 -S5 4059 021.1
FS6 -S6 4213 056.0
FP7 -P7 4086 126.7
FP8 -P8 4067 160.2
5 cm

570334


RACAL
Racal Survey Australia Ltd.
20:58:30 1 Jun 98
N. Explorer
DATUM
E 350945.86
N 5574789.15
φ 039 57 49.61S
λ 145 15 17.23E
Hdg 272.6 T
Wp:White Ibis-1 #1
Wp R 3.8 Ft
Wp B 98.6 T
R(F) B(T)
FP1 -P1 4221 201.9
FP2 -P2 4063 237.1
FS3 -S3 4332 306.5
FS4 -S4 4271 340.4
FS5 -S5 4059 021.1
FS6 -S6 4213 056.0
FP7 -P7 4086 126.7
FP8 -P8 4067 160.2
350650E
5574690N
SCALE 1:1000
TICK INT 10M

5 cm

570335

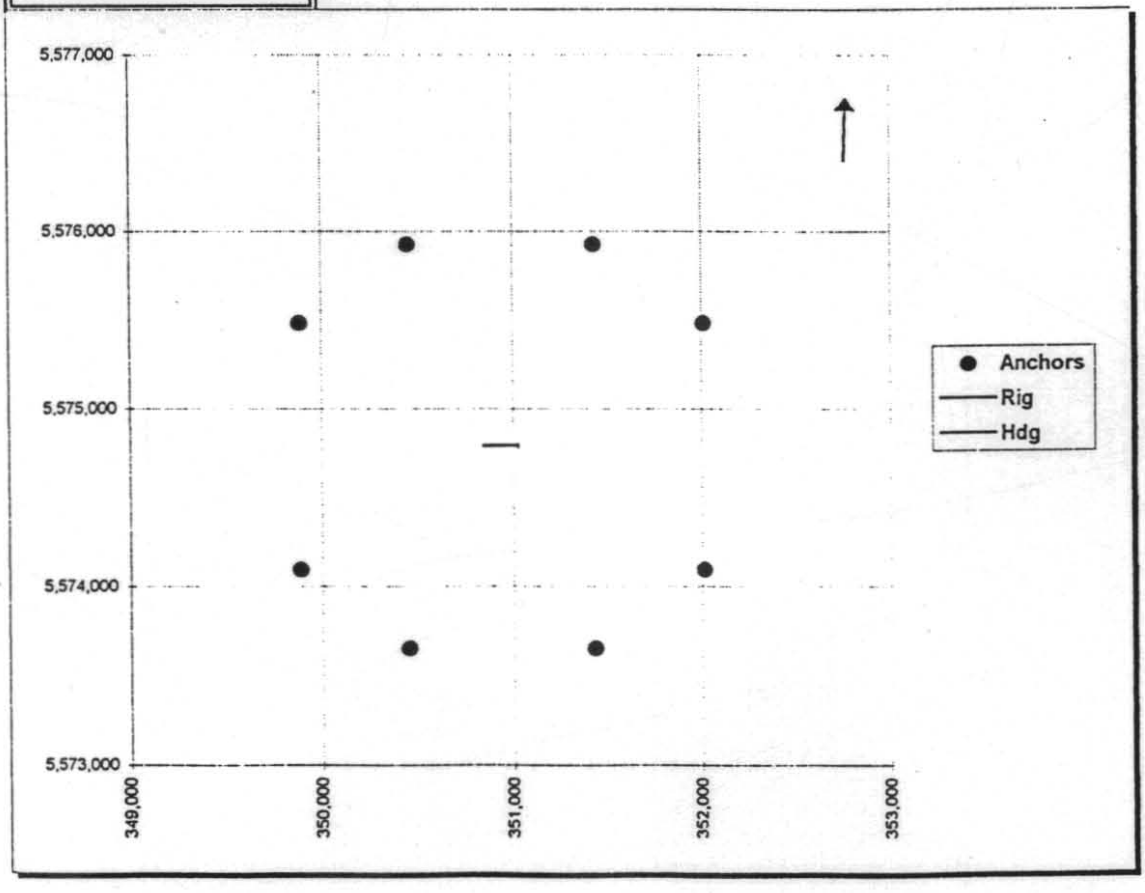
APPENDIX H

ANCHOR PATTERN DETAILS - WHITE IBIS-1

Intended Anchor Drop Locations

Intended Location		Anchor#	Winch Offset		Cable out		Anchor Location	
Easting	Northing		X	Y	Rng	Brg	Easting	Northing
350947.00	5574789.00	1	-3.9	71.0	1204	200.0	350464.21	5573653.71
Intended Heading		2	-1.4	73.0	1204	235.0	349887.74	5574097.01
270		3	1.4	73.0	1204	305.0	349887.74	5575480.99
Location Name		4	3.9	71.0	1204	340.0	350464.21	5575924.29
White Ibis-1		5	5.3	-76.0	1204	20.0	351434.79	5575925.69
		6	2.2	-76.0	1204	55.0	352009.26	5575481.79
		7	-2.2	-76.0	1204	125.0	352009.26	5574096.21
		8	-5.3	-76.0	1204	160.0	351434.79	5573652.31

RACAL



5 cm

white Bas-1

570337

Anchor Co-ordinates (Intended):

Main Anchors:-				First Backup:-			Second Backup:-		
Anc#	Description	Easting	Northing	Anc#	Description	Easting Northing	Anc#	Description	Easting Northing
P1	P1	350464	5573654	P1A		Undefined	P1B		Undefined
P2	P2	349888	5574097	P2A		Undefined	P2B		Undefined
P3		Undefined		P3A		Undefined	P3B		Undefined
P4		Undefined		P4A		Undefined	P4B		Undefined
P5		Undefined		P5A		Undefined	P5B		Undefined
P6		Undefined		P6A		Undefined	P6B		Undefined
P7	P7	352009	5574096	P7A		Undefined	P7B		Undefined
P8	P8	351435	5573652	P8A		Undefined	P8B		Undefined
P9		Undefined		P9A		Undefined	P9B		Undefined
P10		Undefined		P10A		Undefined	P10B		Undefined
P11		Undefined		P11A		Undefined	P11B		Undefined
P12		Undefined		P12A		Undefined	P12B		Undefined
S1		Undefined		S1A		Undefined	S1B		Undefined
S2		Undefined		S2A		Undefined	S2B		Undefined
S3	S3	349888	5575481	S3A		Undefined	S3B		Undefined
S4	S4	350464	5575924	S4A		Undefined	S4B		Undefined
S5	S5	351435	5575926	S5A		Undefined	S5B		Undefined
S6	S6	352009	5575482	S6A		Undefined	S6B		Undefined
S7		Undefined		S7A		Undefined	S7B		Undefined
S8		Undefined		S8A		Undefined	S8B		Undefined
S9		Undefined		S9A		Undefined	S9B		Undefined
S10		Undefined		S10A		Undefined	S10B		Undefined
S11		Undefined		S11A		Undefined	S11B		Undefined
S12		Undefined		S12A		Undefined	S12B		Undefined

Anchor Co-ordinates (Drop):

Main Anchors:-				First Backup:-			Second Backup:-		
Anc#	Description	Easting	Northing	Anc#	Description	Easting Northing	Anc#	Description	Easting Northing
P1	P1	350419	5573584	P1A		Undefined	P1B		Undefined
P2	P2	349847	5574096	P2A		Undefined	P2B		Undefined
P3		Undefined		P3A		Undefined	P3B		Undefined
P4		Undefined		P4A		Undefined	P4B		Undefined
P5		Undefined		P5A		Undefined	P5B		Undefined
P6		Undefined		P6A		Undefined	P6B		Undefined
P7	P7	352035	5574061	P7A		Undefined	P7B		Undefined
P8	P8	351464	5573624	P8A		Undefined	P8B		Undefined
P9		Undefined		P9A		Undefined	P9B		Undefined
P10		Undefined		P10A		Undefined	P10B		Undefined
P11		Undefined		P11A		Undefined	P11B		Undefined
P12		Undefined		P12A		Undefined	P12B		Undefined
S1		Undefined		S1A		Undefined	S1B		Undefined
S2		Undefined		S2A		Undefined	S2B		Undefined
S3	S3	349796	5575556	S3A		Undefined	S3B		Undefined
S4	S4	350414	5576012	S4A		Undefined	S4B		Undefined
S5	S5	351445	5575955	S5A		Undefined	S5B		Undefined
S6	S6	352072	5575528	S6A		Undefined	S6B		Undefined
S7		Undefined		S7A		Undefined	S7B		Undefined
S8		Undefined		S8A		Undefined	S8B		Undefined
S9		Undefined		S9A		Undefined	S9B		Undefined
S10		Undefined		S10A		Undefined	S10B		Undefined
S11		Undefined		S11A		Undefined	S11B		Undefined
S12		Undefined		S12A		Undefined	S12B		Undefined

570338

APPENDIX I

DAILY LOG SHEETS

570339

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 20.5.98 Client: PREMIER Job No.: 276743 Vessel: Northern Location: Bass Strait

21.5.98

Explorer III

PAGE 1 OF

Equipment	Op	S&V
SkyFix		✓
LandStar		✓
Gyro		✓
PCGNS		✓
MultiFix II		✓
GRREP		✓
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ WEDNESDAY, 20 MAY 98
0700	P. ANANTH Departs K.L. for Singapore / Melbourne
1430	J. TIGHE Departs Brisbane for Melbourne.
1700	J. TIGHE arrives Melbourne, accommodated Travelodge Tullamarine
2200	P. ANANTH arrives Melbourne, " " "
2359	Standby.
	THURSDAY 21 MAY 98
0700	Personnel depart Travelodge for Essendon airport
0930	Arrive Essendon A/P.
1140	Personnel advised travel to rig cancelled. To o/n in Melbourne.
	Premier Oil Co. Man Charles Stirrett advises OK for personnel
	to accommodate at RYDGES Hotel, Melbourne at Premiers Corporate rate
1220	Personnel transfer to RYDGES Hotel.
2359	Standby.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570340

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 22 3 98 Client: Premier Oil Job No.: 2767A3 Vessel: Northern Explorer III Location: Bass Strait

PAGE 2 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
J. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200	3	1.6	285°/2
1800	5	3.1	350°/3

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby
0900	Personnel depart Rydges Hotel for Essendon Airport.
1210	Personnel depart by helicopter for Northern Explorer III
1315	Arrive N.E. III
1420	Racal personnel complete Safety Induction. Commence transfer and locating survey equipment.
1440	Commence set up. 1735. BRUTE TIDE departs for anchorage.
1815	Rig battening down in preparation for severe weather.
1910	Survey nav. on line, rig 2.3 metres from location on Spot/Skyfix
2000	Survey Gyro powered up.
2045	SKYFIX on line.
2250	Tensions on anchor cables readjusted, rig moved off location.
	22 metres S/W of location (I-beam dropped in this vicinity - reportedly between locations)
2359	Standby.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEY ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570341

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

ate: 23.5.98 Client: Premier Oil Job No.: 276743 Vessel: Northern Explorer 3 Location: Bass Strait

PAGE 3 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. BRADY
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000	7	6m.	32 / 5
0600	7	6.9	340 / 4
1200	7	8.4	340 / 6
1800	7	9.7	265 / 6

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby – rig at standoff location
1300	Safety meeting held. Due to 50Kts W/NW wind & 10 metre seas,
	personnel advised not to venture outside accommodation etc.
	unless necessary. 2250: Tensions adjusted, rig moved 10m. from locatio
2359	Standby ~~approx 25 metres~~ S/W from well head.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEY ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570342

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 24.5.98 Client: Premier Job No.: 276743 Vessel: Northern Explorer III Location: Bass Strait

PAGE 4 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000	7	9.7	265/51
0600	7	9.2	210/50
1200	6	5.1	220/3
1800	6	4.5	190/3

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby rig 10 metres from location
0825	Start fixing/logging rig position at 30 minute intervals.
0950	Check measured antenna offsets GPS X+6.55, Y+53.4 53.9
	Z+20.4 not measured, retained from previous R/m.
	Previous X+6.6. Y+54.4; Z = 20.4
1245	GRREP computer installed in wheelhouse.
1300	Safety Videos/Meeting held in lieu of Emergency Drill
1658	Gyro calibration by sun observation completed. Sextant angles.
	2 obs. only, seas rough, 30-40 Knot wind.
	C-O calcs -2.26° Average: -2° entered to GNS.
1800	Winching to location YOLLA-2 as drilled.
1852	Winching complete, rig within 3 metres of well head.
359	Standby.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570343

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 25.5.98 Client: Remlex Oil Job No.: 2767A3 Vessel: Northern Explorer III Location: Yolla-2

PAGE 5 OF

Equipment	Op	
SkyFix	/	
LandStar	/	
Gyro	/	
PCGNS	/	
MultiFix II	/	
GRREP	/	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000	5	4.	185
0600	5	3.8	180
1200	5	4	190
1800	4	4.5	180

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby
0730	Sun obs. by sextant & gyro calibration completed. C-O = -2.58°
0745	ROV in water Port Side
0913	ROV confirms rig to be within 1 metre of well head.
	C-O entered to nav. system as -2.6°
1036	40 Position fix commenced. 1100: Fix completed.
	Datum position is 1.27 metres on bearing 00.8°T from published Yolla
1400	Loading 6 x 9.4 ton anchors from Buk Tide to NE III
2359	Standby

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570344

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 26.5.98 Client: Premier Oil Job No.: 2767A3 Vessel: Northern Explorer III Location: Yolla-2

PAGE 6 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000	4	3.1	200/2
0600	4	2.0	200/2
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby.
1430	Advised by PREMIER OIL that tug to grapple for #8 (buoy sank) then drop #1 short for rig to move 112m. on 355° to standoff for well head casing blast.
1534	Gyro calibration by sun obs. by theodolite completed. C-O = -2.50° Entered to CNS. Racal Gyro 263.2, Rig gyro 262.2 (helmsmans)
1700	Racal Gyro 263.3, Rig gyro 263.0 (under bench)
1730	Pacific Commander rigged for grappling #8 buoy & clear on bearing & distance from rig.
1900	Standoff distance altered to 127 metres minimum.
2030	P.C. has anchor ok. on deck & recovery.
2056	Cable, winch in/out distances to standoff location to buoy. captain.
2254	Piggy back on deck & secured P/Commander.
2359	buoy on deck, recovering jewelry. Fixing/logging at 15min. intervals.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570343

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 27.5.98 Client: Premier Oil Job No.: 276743 Vessel: Northern Explorer Location: YOLLA-2

PAGE 7 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P ANANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.	
0000	3	~~3.7~~ 1.6	310	/
0600	4	1.6	320	/
1200	5	2.7	290	/
1800	5	3.7	290	/

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	P. Commander recovering jewelry. Fixing/logging rig position at 15min intervals
0146	Chain recovered, winching in rig wire.
0238	#8 wire back to rig. P.C. to #1 buoy. 0253: #1 buoy on deck.
0334	Rig back on deck P.C. 0359: #1 anchor off bottom.
0434	#1 anchor dropped in new position. From rig radar on mast 175°, 0.45 n.m.
	#1 anchor new position 398308, 5586323
0455	Winching rig to standoff location 0503: #1 buoy in water
0550	Winched to standoff location. Wellhead is on bearing 167° for 186 metres.
0607	Explosives set off. 0619: Winching back to YOLLA-2 0721: On location.
0930	Racal Gyro 264.5°, Ship Gyro 264.1° O.K.
1115	Fine tuning rig position with drillstring/tree/wellhead/ROV.
1345	Moved DGPS Antenna to new location, measured offsets.
	forward rail on top nav. bridge deck X = -3.75, Y = 59.65
	(16.95 ahead of face of acc block) 35-40 Knot winds, 4m. Seas.
1415	~~Racal~~ DGPS Trimble antenna splitter used for Q-Star Q.C. Nav.
	(S/N ratio on Multifix decreased.)
1427	Fixing/logging at 60 minute intervals.
2359	Standing

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570546

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 28.5.98 Client: Pioneer Oil Job No.: 27-7A3 Vessel: Northern Explorer 3 Location: Y-LOCA-2

PAGE 8 OF

Equipment	Op	
SkyFix	/	
LandStar	/	
Gyro	/	
PCGNS	/	
MultiFix II	/	
GRREP	/	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
I. ANANTH
Client Personnel
I. SMITHIE

WX	Sea State	Swell	Wind Dir.
0000	5	2.5	300
0600	4	2.3	250
1200	5	3.1	310
1800	5	2.3	300

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby.
0250	Drill string position 398273, 5587155 over well head by ROV visual
	Winching rig to port on ROV request.
0303	ROV sight well head. 0304: ROV placing charge on well head.
0402	Winching rig to stand off location. 0437: At stand off — 190m from Y-
0442	Explosives set off 0445: Winding back to location Y-2
0529	On location Y-2 0600: ROV on water.
0910	Requested to check on nav. system as ROV can't find well head. All O.
	Q-Star QC confirms position. System data printout checked.
0930	I-beam found by ROV, searching for well head.
1032	ROV reports I-beam is 27 metres south of well head. — waypoint
	entered to nav. system.
1055	Moving rig to I-beam position
1057	Racal gyro reads 259.5, Ship gyro 259.8 (O.K)
1105	GPS antenna splitter to Q-Star QC disconnected.
1133	All stbd anchor winches ±4 metres from I-beam reported position.
1230	Rig pos. 398275, 5587131 Hdg 261° T.
	8 metre astern position = 398282, 5587132 entered as W.P.
1305	Rig in position for I-beam recovery.
1311	New position requested. 4 metres astern of 398282, 5587132
	Hdg 260° = 398286, 5587133 1405: I-beam recovered.
1443	SKYFIX & LandStar Differential Corrections Melbourne Sydney Adelaide
	are off, running off AUCKLAND SFIX ONLY
1540	SKYFIX & LandStar OK — No Adelaide SFHLS or Sydney Auck LS.
1938	#5 chain recovered by P. Commander. 1946. Recovering #5 wire.
2200	#1 wire recovered. 2359 Standby.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570547

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 29.5.98 Client: Fremantle Job No.: 2701A3 Vessel: Northern Explorer 3 Location: Area-2

PAGE 9 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SCARGIE

WX	Sea State	Swell	Wind Dir.
0000	4	2.7	310 ✓
0600	5	3.0	320 ✓
1200		4.0	
1800		2.6	

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby
0930	Racal Gyro = 264°, Ship Gyro = 264.2° = OK.
1045	Rig heading altered to weather by adjusting wire out #6. (278°)
2359	Standby.

✓ Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570348

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 30.5.98 Client: Vernier Oil Job No.: 276143 Vessel: Northern Explorer 3 Location: Vol A 2

PAGE 10 OF

Equipment	Op	
SkyFix	/	
LandStar	/	
Gyro	/	
PCGNS	/	
MultiFix II	/	
GRREP	/	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
T ANANTH
Client Personnel
I. SCOLLIE

WX	Sea State	Swell	Wind Dir.
0000	5	2·3	3..
0600	5	2·3	27.
1200	5	4·0	2..
1800	4	3·2	23.

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby
0030	Weather conditions improved, Brick Tick (BT) to #4, Pacific Commander (PC) to #7
0319	Rig winching in #4 wire. 0331: #4 Cable on board, BT to #2
0515	#7 recovered. P.C. to #6 0550: #2 buoy on BT. 0620: #6 p.b. on P.C
0715	#2 on deck BT. 0750: #6 Piggyback on deck P.C.
0800	Racal Gyro corrected = 268·0°T, Rig gyro = 268·2°T.
0838	P.C. breaking out #6 anchor. 0850: #6 on deck P.C.
0910	#2 wire secured on rig. Rig at 398290, 5587142. Fixing at 15min int
1000	BT. heading up to #3 buoy/anchor. 1036 #3 p/back anchor broken out
1039	#3 main anchor broken out. (1040: #6 wire secured)
1145	Pacific Commander obtains position fix on Invercider buoy.
	39°50.84 S, 145°47.90 E. = 397196, 5588493.
1209	Winching in final anchor #3 on N.E.3
1248	#3 wire secured, underway to White Bis-1
0052	#4 buoy on B/T 0111: #4 p.back on B/T 0142: #7 buoy on P/C
0200	#4 anchor on B/T 0218: #7 p.back on P/C 0253: #7 anchor on P/C
1601	Rig passing over location proceeding to 1 mile off location.
1603	Racal gyro corrected = 252.7°, Rig gyro = 253°
1627	Anchor dropped 6 shackles (6x90ft.) in water. (164 metres)
1630	Finished with engines Northern Explorer. 348942, 5574481 = Anchor.
2359	Standby, rig preparing anchors for deployment.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570349

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 31.5.98 Client: Premier Oil Job No.: 2767A3 Vessel: Northern Explorer 3 Location: White Ibis-1

PAGE 1 / OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANANTH
Client Personnel
I. SLEIGHT

WX	Sea State	Swell	Wind Dir.
0000	4	2.1	200
0600		2.1	
1200	2	2.8	220
1800		2.1	

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby. Preparing anchors: Fixing rig position at 15 minute intervals.
0730	Racal correction: gyro 22.2°, Tej gyro 22.5° OK
0745	Changed Q-Star DC Diff Corrections from SKYFIX to SKYFIX SHOT.
1315	Fire/Lifeboat Drill commences 1400: Drill completed.
1448	Anchor preparation completed. 1503: Heading altered to 270° for W.I-1
1511	Commence raising anchor. 1523 Anchor on board, Underway W.I-1
1600	B.Tide. hooking up to #2 wire, on location.
1642	Wire on deck B/Tide
1718	P.Commander hooking up to #6. 1745 B/T ready to run out 2
1822	B/T running out #2.
1836	0.67nm. range to B/T s/Rr = distance out = 1241m., 237° (~~Fairlead~~ ~~Radar Pos~~)
1858	.74, 235° OTG #2 from radar position (fix)
1916	0.76nm. By 57° Radar fix leaving #6
1926	Anchor #2 fix Radar Nest 350874, 5574792 Anchor = 349847, 5574096
"	Anchor #6 fix " " 350907, 5574739 Anchor = 352072, 5575528
2003	#6 OTG 2022: #2 buoy in water.
2140	B/T running out #7
2215	#7 stretched out: Radar = 350907, 5574771 Range (0.72nm) 1333m, 123.3°T.
	#7 anchor = 352035, 5574061 2256. OTG.
2306	#7 buoy in water.
2359	Preparing for #3 and #1

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570350

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

ate: 1.6.93 Client: Premier Oil Job No.: 276743 Vessel: Northern Explorer 3 Location: Wirk Hrs-1

PAGE 12 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. ANTH
Client Personnel
I. SCORGIE

WX	Sea State	Swell	Wind Dir.
0000		2-4	
0600	3	2.0	200
1200		2.1	
1800			

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Preparing for #3 & #1
0015	Pacific Commander running out #3 0122: #3 stretched, 0.74nm 310°
0134	#3 restretched out: Radar: 350905, 5574783 Range (0.73nm.) 1352m, 306°T.
	#3 anchor = 349796, 5575556 OTB: 0136 (?) anchor lowered to stretch.
0157	#3 buoy in water. 0358: Brak Tide running out #4
0422	#4 stretched out: Radar = 350906, 5574773. Range (0.72nm.) 1333, 339.5° T.
	#4 anchor = 350414, 5576012: 0503: ~~0537~~ : OTB, Brak Tide.
0515	#4 buoy in water
	P.C. running out #1
0535	#1 stretched out: Radar 350904, 5574766. Range (0.69nm.) 1278, 203.5°T.
	#1 anchor = 350419, 5573584 0538: O.T.B., P. Commander
0557	#1 buoy in water.
0700	Racal Gyro Corrected = 272.6; Rig Gyro = 272.8 OK.
0830	B/Tide preparing for #5, P. Commander #8
1000	NOTE: Anchors 3, 4 and 1 - position fix includes pennant wire distance
	Distance out from winch should be 1267m.
1011	B.T. running out #5.
1020	Radar nm. 64, 24°T to B/T lowering anchor #5 stretched out.
1028	Radar to #5 s/keller B/Tide 0.67nm. (1241m) by 20°T from #5 winch
	#5 winch ~~350834~~, ~~5577776~~ #5 anchor ~~351435~~, ~~5575950~~.
1044	P. Commander running out #6. 1127 #5 OTB 1138: Buoy in water.
1228	To S/R #8, 161° 0.66nm (1222m.) Pacific Commander, lowering anchor #8
	Winch position ~~350893~~, ~~5577773~~. Anchor ~~351313~~, ~~5573626~~
1230	#8 O.T.B. 1248: Buoy in water. ✱1202: Commence pretensioning anchors.
1300	Winch offset tracking positions re-entered for anchors 5 + 8.
	#5 winch ~~350577~~, ~~5574783~~ #5 anchor ~~351278~~, ~~5575954~~.
	350444 5574781 #5 anchor 351445, 5575955

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570351

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

ate: 1-6-95 Client: Fremen Oil Job No.: 2767A3 Vessel: Northern Location: White Rose 1

Explor 3 PAGE 13 OF

Equipment	Op	
SkyFix	✓	
LandStar	✓	
Gyro	✓	
PCGNS	✓	
MultiFix II	✓	
GRREP	✓	
SkyTrac		

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TICHE
P ANANTH
Client Personnel
I. SMITHIE.

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
1335	#8 winch at dlop. 351044, 5574771 · #8 anchor · 351464, 5573624
1400	Shipping invoice to rig Storeman + Co. man + Survey rep.
1624	Racal Cable In/out distances supplied to Bridge Captain.
1720	Reticencioning completed.
1840	Rig on location tensions requested to monitor.
	Final Fix Commenced. Adelaide + Melbourne SKYFIX spot 10°/45
1843	Multifix logging started. 152-0643
2000	Final Fix Completed. GNS Stored ANAL 2 (C:) ANAL 2 (A:)
	Start demobilisation.
2200	Equipment demobilised 14 Boxes/Items placed at rear of
	bridge deck for transfer to container then boat to Melbourne.
2359	Standby

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

570352

RACAL SURVEY AUSTRALIA LIMITED
DAILY RECORD SHEET

Date: 2/6/95 Client: PREMIER OIL Job No.: 276743 Vessel: Northern Explorer Location: White Ibis-1

PAGE 1 OF 4

Equipment	Op	SBY
SkyFix		✓
LandStar		✓
Gyro		✓
PCGNS		✓
MultiFix II		✓
GRREP		✓
SkyTrac		X

Equipment	Op	
Deso Echo Sounder		
Sidescan		
Boomer		
Heave Co.		
STD-12		
ENSIN		

Racal Personnel
J. TIGHE
P. AVANTH
Client Personnel
I. SLATTERY

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 10
0000	Standby
0815	Advised by Company main of possible move of rig to re-spud. Navigation equipment may be required. 0845: Not required.
0950	Personnel depart for Essendon 1055: Arrive Essendon
1220	I.S. departs for Perth. 1305. JT. departs for Brisbane
11.00	P.A. departs for Singapore / KL.
	END OF JOB.
0830	Racal equipment in container onboard Pacific Commander. Connected.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE : Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

APPENDIX 11

FINAL WELL REPORT

By

GEOSERVICES OVERSEAS S.A.

WHITE IBIS 1

570354

PREMIER OIL

AUSTRALASIA

WHITE IBIS-1

FINAL WELL REPORT

Prepared by

Geoservices Overseas S A

Geoservices Overseas S.A.
U 8 / 14-22 Farrall Road
Midvale WA 6056
Australia
Tel : (08) 9250 2010
Fax : (08) 9250 2715
Email: geosrv.per@bigpond.com

Premier Oil Australasia
45 Ord Street
West Perth
W.A. 6872
Tel : (08) 94804100
Fax : (08) 93241851

REVIEWED BY	DATE	FINAL COPY #
	13/9/98	1

570355

CONTENTS

Page No.

General Information

Well Summary	3
Well Data	4
Days Vs Depth	5
Sample Collection Summary	6

Geological Information

Lithological & Show Summary	7
Overpressure Summary / Trip Gas & Deviation Tables	12

Drilling Information

Drilling Review 914 -660 mm section	16
Drilling Review 444 mm section	17
Drilling Review 311 mm section	18
Mud Record Table	20

Appendices

1.	Bit Record				
2.	Formation Evaluation Log	(A4)	74-2220 m	Scale	1:500
3.	Pressure Evaluation Log		74-2220 m	Scale	1:1000

570356

Well Summary

The Bass Basin (220 km south of Melbourne) is a late Mesozoic - Cainozoic intra-cratonic basin, trending northwest-southeast between Victoria and northern Tasmania. It is separated from the Torquay Sub-basin to the west, and northwest by the King Island - Mornington Rise, which began to form in the Miocene, and from the Gippsland Basin to the east by the Palaeozoic rocks of the Bassian Rise.

The White Ibis-1 exploration well was designed to further evaluate the hydrocarbons present in the sands of the Eastern View Coal Measures (EVCM) 45 metres updip from the Bass-3 well (Drilled in 1967 by Esso). Data from Yolla suggests a high probability that the White Ibis fault is sealing. It is prognosed that the well will intersect the Top EVCM secondary objective at 1582 mSS, the Top Palaeocene primary objective at 1924 mSS and will reach total depth at 2150 mSS within metamorphosed basement rocks.

White Ibis-1 was spudded on the 1st of June 1998 by the "Drill ship" MODU "Northern Explorer III". The well was drilled in 3 hole sizes: 914 mm, 444 mm, and 311 mm with 762 mm casing being set at 130.6 m and 340 mm casing at 863 m. The well was drilled to a final depth of 2220 m (2219.94 m TVD) @ 00:30 hours on the 19 th of June 1998.

Logs were attempted once the well reached TD, however, hole problems at 918m and 938m would not allow the logging suite into the hole. After several attempts and a wiper trip it was decided to run 9 5/8" casing to above the zone of interest. This was run and cemented with the shoe at 1878m.

The 914 mm and 444 mm hole sections were drilled with seawater and high viscosity guar gum sweeps, with returns to the sea floor. The 311 mm hole section was drilled with a KCL/PHPA mud. There were no major problems encountered whilst drilling White Ibis-1, there were no problematic downhole losses except at 1770 m (50+BPH) which was treated with baro-fibre.

Geoservices performed full mudlogging analysis and pressure detection using advanced equipment, throughout the drilling of White Ibis-1. Gas was constantly monitored using both a Geoservices FCP chromatograph and FGP total gas detector. H_2S and CO_2 were also monitored with only minor CO2 & trace H2S in the mud being recorded.

All depths given are measured depths from the rotary table unless specified otherwise.

570357

Well Data

Operator	: Premier Oil Australasia
Well name	: White Ibis-1
Country	: Australia
Basin	: Bass basin
Permit	: T/18P
Field	: Bass
Profile	: Vertical Exploration
Depth Reference	: LAT
Rotary Table (LAT)	: 12.5 m
Water depth	: 61.9 m
Rotary Table - Seabed	: 74.4 m

Latitude	: 39°57' 49.607" S
Longitude	: 145° 15' 17.234" E
Easting	: 350 945.86 m E
Northing	: 5 574 789.15 m N

Total Depth	: 2220.0 m MD, 2219.94 m TVD
Date spudded	: 1st June 1998
Date TD reached	: 19th June 1998
Final status	: 9 5/8" Casing to 1878m.

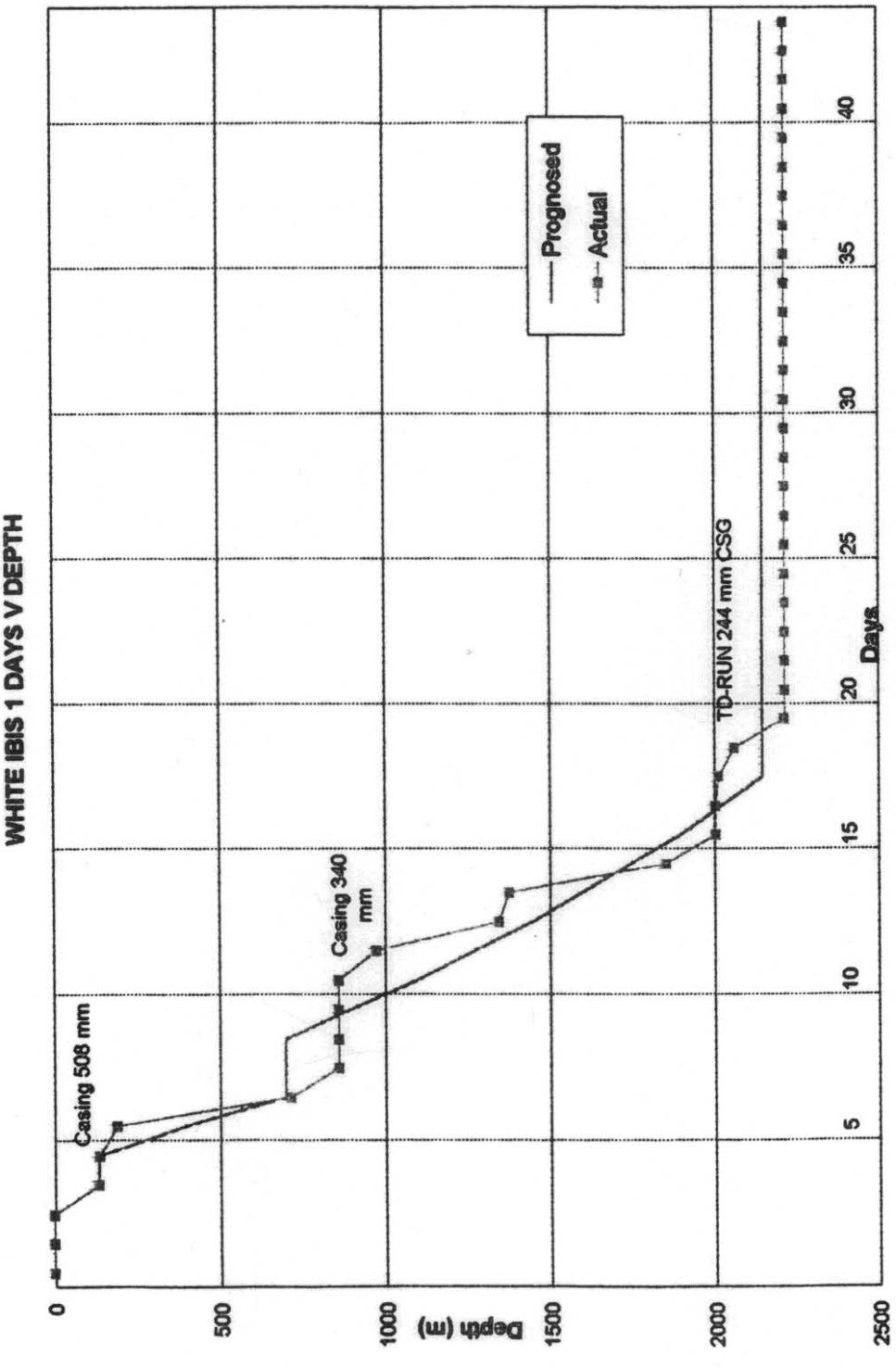
Contractor Information

Drilling	: Northern Offshore Ltd
Rig name	: Northern Explorer III
Rig type	: Drill ship
Mud logging	: Geoservices Overseas S.A.
Mud engineering	: Dowel Schlumberger
MWD	: Anderdrift
Wireline logging	: Schlumberger
Production testing	: Schlumberger
Cementing	: Dowell Schlumberger
Casing	: Premium Services
Work boat	: Pacific Commander/Black Raider
Helicopter	: Lloyds

Geoservice Personnel

ALS Engineers	: Oades, Steve
	: McGilveray, Paul
Mudloggers	: Tran,Vu Anh Tu
	: Ngo, Quang Hien

570358


WHITE IBIS 1 DAYS V DEPTH
Prognosed
Actual
Casing 508 mm
Casing 340 mm
TD-RUN 244 mm CSG
Depth (m)
Days
0
500
1000
1500
2000
2500
5
10
15
20
25
30
35
40

5 cm

570359

Sample Collection Summary

2 sets of Unwashed Samples (300 grams):
5 m intervals from 866-1750 m
3 m intervals from 1750 - 2220 m (TD)

4 sets of Washed and Dried Samples (100 grams):
5 m intervals from 866-1750 m
3 m intervals from 1750 - 2220 m (TD)

1 set of Samplex Trays:
5 m intervals from 866-1750 m
3 m intervals from 1750 - 2220 m (TD)

Sample Distribution:

Sample Distribution		Unwashed	Washed and Dried	Samplex Trays
Premier	:	1	1	1
Boral Energy	:	1	1	
BRS	:		1	
Mineral & Resouces Tasmania	:	1		

570360

Lithological & Show Summary - White Ibis #1

Formation	Prognosed	Actual	Thickness
Torquay Group	72.5 mRt	74.5 mRt	1355.5
Angahook Formation	Not Expected		
Top Demons Bluff	1440.5 mRt	1430.0 mRt	147 m
Eastern View Coal Measures (EVCM)	1594.5 mRt	1577.0 mRt	596 m
Basement	2112.5 mRt	2173.0 mRt	

LITHOLOGICAL DESCRIPTIONS

73.5 - 866 m **Returns to sea floor**

866-1205 m **Claystone with minor Limestone grading to Calcilutite in part.**

Claystone — Grey to light grey, medium grey in part, slightly to very calcareous with depth, grades to Calcilutite, soft to firm, amorphous in parts, silty in part, trace very fine quartz grains, trace black specks, trace micromica, trace disseminated pyrite & pyrite nodules, blocky to sub blocky, massive in parts, trace to common fossil fragments.

Limestone — Trace, off white, light grey- grey brown- pale yellow grey, argillaceous in parts, slightly dolomitic, grades to Calcarenite in parts, soft to firm, sticky in parts, trace fossil fragments, microcrystalline to cryptocrystalline, sub blocky, trace Calcite, no visible porosity, no shows.

1205-1290 m **Claystone with minor Sandstone, with trace Limestone.**

Claystone — Light grey to occasional light brown grey, slightly calcareous decreasing with depth, arenaceous in part grading to Siltstone, common black carbonaceous specks, trace micro micaceous, trace disseminated and nodule pyrite, trace fossil fragments, soft to sticky, occasionally firm, blocky to sub blocky, slightly fissile in part.

Sandstone — Light grey to light brown, very fine to fine grained, sub angular to sub rounded, moderately well sorted, moderately hard calcareous cement, trace kaolinite matrix, trace pyrite, trace glauconite, fossil fragments, trace black carbonaceous specks, poor inferred porosity, grades to Calcisiltite in part, no fluorescence.

Limestone — Off white, yellow grey, moderate to very calcareous, slightly dolomitic in part, microcrystalline, trace forams, trace fossil fragments, soft to sticky, moderately hard in part, no visual porosity, grades to Dolomite in part.

570361

LITHOLOGICAL DESCRIPTIONS

1290-1540 m **Claystone with minor Siltstone & Limestone, trace Sandstone.**

Claystone — Light grey to occasional light brown grey, slightly calcareous decreasing with depth, arenaceous in part grading to Siltstone, common black carbonaceous specks, trace micro micaceous, trace disseminated and nodule pyrite, trace fossil fragments, soft to sticky, occasionally firm, blocky to sub blocky, slightly fissile in part.

Siltstone — Light grey brown-brown white, moderately calcareous cement, common very fine grained well rounded quartz, argillaceous in parts, grades to very fine Sandstone in part, trace carbonaceous specks, trace glauconite, rare pyrite, moderately hard-hard, sub blocky to blocky.

Limestone — Yellow grey to white, microcrystalline, very calcareous, slightly dolomitic, trace forams and fossil fragments, soft-moderately hard, no visual porosity.

Sandstone — Light grey to light brown, very fine to fine grained, sub angular to sub rounded, moderately well sorted, moderately hard calcareous cement, trace kaolinite matrix, trace pyrite, trace glauconite, fossil fragments, trace black carbonaceous specks, poor inferred porosity, grades to Calcisiltite in part, no fluorescence.

1540-1605 m **Siltstone with minor Claystone interbeds with minor to trace Sandstone, Limestone & Dolomite.**

Siltstone — Yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.

Claystone — Medium brown, light grey to olive grey in part, nil to slightly silty, moderately calcareous, common disseminated and nodule pyrite, trace carbonaceous specks, trace very fine quartz grains in part, trace mica, rare forams and fossil fragments, sub blocky to amorphous in part, soft to firm.

Sandstone — Brown, brown grey, transparent-translucent, very fine to fine grain, moderately well sorted, sub angular to sub rounded, minor glauconite, trace carbonaceous specks, trace pyrite, weak calcareous cement, trace dolomitic, argillaceous matrix, friable to hard, poor visual porosity, no fluorescence.

Limestone — Off white-yellow grey, moderate to very calcareous, slightly dolomitic, microcrystalline, trace foram and fossil fragments, soft to sticky, occasional moderately hard, no visual porosity.

570362

LITHOLOGICAL DESCRIPTIONS

Dolomite	Light brown-medium yellow brown. crypto crystalline, occasional microcrystalline, sucrosic-waxy texture in part, trace very fine quartz grains, trace glauconite, argillaceous in part, very hard to hard, blocky.
1605-1645 m	**Sandstone with minor Siltstone & Claystone.**
Sandstone	Light grey, transparent-translucent, fine to very coarse, common coarse, poorly sorted, sub angular to rounded, minor glauconite, trace carbonaceous specks, trace pyrite, dominantly loose, occasional dolomitic and kaolin matrix, hard to friable in part, moderate to good inferred porosity, no fluorescence.
Siltstone	Yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Claystone	Medium brown, light grey to olive grey in part, nil to slightly silty, moderately calcareous, common disseminated and nodule pyrite, trace carbonaceous specks, trace very fine quartz grains in part, trace mica, rare forams and fossil fragments, sub blocky to amorphous in part, soft to firm.
1645-1685 m	**Claystone interbedded with minor Siltstone & Sandstone.**
Claystone	Light brown to light brown grey, grey, very slightly silty in part, common micro micaceous, disseminated pyrite, trace carbonaceous specks, slightly calcareous, sticky, very soft to firm, sub bulky to amorphous in part.
Siltstone	Yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Sandstone	Light grey, occasional yellow brown, transparent-translucent, very fine to fine grain, moderately well sorted, sub angular to sub rounded, rare glauconite, trace red lithics, trace carbonaceous specks, weak kaolin matrix and calcareous cement, moderately hard to friable, fair inferred porosity, trace mineral fluorescence.
1685-1730 m	**Claystone with minor Sandstone, Siltstone & Shale interbeds.**
Claystone	White, light grey, occasional grey brown, greenish grey, trace mica and pyrite, carbonaceous specks, nil calcareous, slightly sticky, very soft to soft, occasionally firm, amorphous to sub blocky.

570363

LITHOLOGICAL DESCRIPTIONS

Sandstone	Light grey, transparent-translucent, white, very fine to medium grain, occasional coarse, moderately well sorted, sub angular to sub rounded, trace pyrite and mica, trace red lithics, weak calcareous cement, kaolin matrix, loose to friable, poor inferred porosity, trace mineral fluorescence.
Siltstone	Yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Shale	Medium grey, green grey, occasional light brown grey, slightly silty, micro micaceous, moderately calcareous, trace disseminated and nodule pyrite, trace carbonaceous specks, trace very fine quartz grains in part, firm to slightly hard, sub blocky to fissile, occasional semi laminated.
1730-1770 m	**Sandstone with minor Claystone & Siltstone interbeds.**
Sandstone	Clear, light grey, very fine to medium grain, occasional coarse, poor to moderately sorted, sub angular to sub rounded, occasional angular, trace disseminated pyrite, trace micro micaceous, trace carbonaceous specks, trace glauconite, rare red lithics, minor aggregates with kaolin matrix, minor calcareous cement, poor visible porosity, no fluorescence.
Claystone	Light brown, brown grey, silty, slightly calcareous, trace disseminated pyrite, micro micaceous, trace carbonaceous fleck, trace lithic, sub blocky to amorphous, sticky, soft to firm.
Siltstone	Light brown grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae with depth, firm to moderately hard, massive to sub blocky.
1770- 1910 m	**Sandstone with interbedded Claystone.**
Sandstone	Light brown, light grey, translucent to transparent, white, very fine to very coarse grain, common coarse, poorly sorted, sub rounded to angular, trace disseminated pyrite & mica, trace siderite, weak to non calcareous cement, trace siliceous cement, trace kaolin matrix, friable to loose, good visible-inferred porosity, no to trace mineral fluorescence with depth.
Claystone	Light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, soft to firm, sub blocky to blocky, grading to Siltstone.

570364

LITHOLOGICAL DESCRIPTIONS

1910- 2173 m **Sandstone with interbedded Claystone with minor Siltstone & trace Coal seams.**

Sandstone — Light brown, light grey, dominantly translucent to transparent, white, fine to very coarse grain, common medium, poorly sorted, sub rounded to angular, trace disseminated pyrite & mica, trace siderite, weak to non calcareous cement, siliceous cement, trace kaolin matrix, friable to loose, fair inferred porosity, nil to trace fluorescence.
Fluorescence: 2007-2008m: trace faint dull yellow fluorescence, weak streaming dull yellow cut, yellow white residual ring.

Claystone — Light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, trace carbonaceous specks, soft to firm, sub blocky to blocky, grading to Siltstone.

Siltstone — Medium brown grey, dark grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae, trace pyrite, calcareous in part, trace Limestone, trace very fine quartz grains, firm to moderately hard, sub blocky to sub fissile.

Coal — Trace, black, dark brown black, dull to sub vitreous lustre, common silty, trace disseminated and nodule pyrite interbedded in part, sub conchoidal fracture, sub blocky to sub fissile, brittle to hard.

2008- 2008.72 m **CORE #1 : 2008-2017 mRt. Recovered 8% :Sandstone.**

Light grey, off white, light brown-frosted, translucent, very fine to coarse grained, predominantly fine to medium, moderately well sorted, sub rounded to sub angular, common kaolinite matrix, siliceous cement, trace carbonaceous matter, trace lithic fragments, trace mica flakes, friable, poor-moderate visible porosity.
Fluorescence: trace, dull yellow white pinpoint fluorescence, slow streaming dull greyish white cut, bright chalky white residual ring.

2173- 2223 m **Metamorphic Basement.**

Metamorphic — White to milky white, translucent to transparent, pale red, purple to pink, occasional yellow brown & pale green, common blocky angular fragments, common feldspars and occasionally altered to kaolin, angular quartz crystals, trace pyrite and mica, trace dark green hornblende and black pyroxene, hard to very hard, common massive texture and granular in part.

570365

OVERPRESSURE SUMMARY

Introduction

There are several techniques available which when used in the appropriate overpressured environment, can effectively predict an approaching overpressured zone while drilling. Each technique may give slightly different results according to geological and drilling conditions. By combining both the qualitative and quantitative techniques discussed below, with correct interpretation the best results are achieved. The constant monitoring and quick response to gas, flow and pit levels is however still the most accurate means of determining borehole state.

Geoservices currently makes use of the following parameters to indicate overpressured regions whilst drilling:

D-Exponent: This is a normalized rate of penetration which takes into account mud weight, bit wear and hydraulics. It can be reliably used in shales and clean claystones and as an indicator in siltstones, silty shales and calcareous claystones. It is not valid when PDC bits are used.

A normal trend line is established through normally pressured shale points, representing a normal compaction trend, and any leftward deviation of subsequent shale points from this trend, representing relative undercompaction, indicates overpressure (plotted relative to depth) or increased porosity due to lithology changes.

Sigmalog: The Sigmalog is the variation with depth of the sigma factor, also called "total rock strength". The sigma factor takes into account the same factors as the D-Exponent. It also takes into account a value n, which is a function of permeability and porosity. In this way the sigmalog is expected to overcome D-Exponent problems in carbonate, marl and silty shale sequences. The sigmalog is however extremely difficult to use. A large amount of data is required, and it relies heavily on operator judgement. It is ill-suited for use in exploration wells.

Shale density: Generally sediments undergo compaction concurrent with depth of burial. The compaction results in the expulsion of water. As the matrix density of clay is greater than the one of water, the density of the clay increases as its water content decreases. In the case of overpressured shales where the water has not been able to escape normally the shale density is unnaturally light. Various methods are available to measure shale density. A liquid density column is most commonly used by Geoservices. Clean shales with consistent mineral make up, devoid of contaminants such as mica and silica, are necessary. This method is also very susceptible to errors induced by cavings.

Temperature: By plotting mud flow line temperature against depth a normal temperature gradient can be established. An overpressured zone which is under compacted, and thus hydrated, has a higher temperature gradient as water is a poor conductor of heat relative to rock. Zones of overpressure will hence tend to cause a zone of heat starvation in overlying sediments. This results in a decreased temperature gradient in this zone, creating a "thermal shadow" effect.

The use of temperature as a method of determining overpressure has many limitations. Additions to the mud system at surface, circulation breaks, mud type, length of conductor pipe/riser, hole size, downhole mechanical and hydraulic factors can all adversely effect observed gradients.

Cuttings: Small, splintery cuttings can be used as an indicator of overpressured regions. Long, propeller shaped cuttings are usually an indicator of overpressure. Tabular, flattened cavings are usually more indicative of hydration of reactive or swelling clays. A large increase in caving volume is often a good indication of abnormal pressure. Excessive sloughing resulting in fill is also another valid indicator of abnormal pressure.

Overpull and Drag: Excessive overpull and drag during pipe movement can be attributed to abnormal pressure. Increases in overpull and drag are good indications of borehole instability. In highly deviated wells dog-legs can develop causing excessive overpull.

Resistivity/Conductivity: In normally compacted sediments salinity will increase with depth. Clays during the course of sediment compaction retain ions raising the salinity. A reduction in salinity can be attributed to undercompaction. For this method to work successfully a significant contrast must occur in drilling fluid/formation water salinities. The addition of mud chemicals can also cause variables to be induced.

Torque: While an increase in torque may have a number of causes, one of these can be a change of differential pressure while entering an overpressured zone. Negative differential pressure can cause shales to increase torque in two ways. a) Swelling can occur to reduce hole size. b) Cuttings can accumulate around the bit and stabiliser. Also it has been noted that the plastic state of clays can cause a bit to ball-up (reduced steady torque). Bit balling can often be used to indicate that a Transition zone is being penetrated. With the many additional factors that effect torque, hole geometry, deviation and BHA make-up, care must be taken in assessing torque data. It is however a useful secondary indicator.

Gas: Increases in background, connection and trip gas readings indicate increasing pore pressures and can be used as an indicator of overpressure. However, changes in porosity as a result of changes in formation type can give rise to increases in background, connection and trip gas which are not related to overpressure. Variable flow rates, hole size and penetration rate can also cause considerable changes in background gas levels.
Gas composition is also used as a method of detecting overpressure. In normal compaction there is generally less propane (C3) than ethane (C2). In abnormal sediments often the opposite is true. A C2/C3 ratio of less than 1 is usually an indication of overpressure. All gas data is susceptible to variables resulting from measurement type, degasser position and type, mud properties. Often gas may be recycled and this can induce further errors. Care must be taken in interpretation of gas data in respect to prediction of abnormal pressure.

570367

White Ibis 1

No definitive signs of overpressure were detected while drilling White Ibis-1. Other indicators were considered in addition to ROP. These included flow line temperature gradients which were normal, drill breaks and hole condition.

Some connection gases (approx. 4 times background) were noticed between the sections of 1800 metres to 2080 metres RT. This indicated that the well may have only been slightly overbalanced with a 9.16 ppg mud while drilling this part of the well. No large or splintery cuttings came out of the well at any stage.

The purpose of the overpressure trend plot is to take into account the hole conditions and provide a readable form to determine overpressure. The plot can show differing trends in compaction and changes in drillability within the same formation with all other factors kept constant. The plot for White Ibis-1 does not show significant overpressure. Very slight or marginal overpressure is open to interpretation due to the interplay of many factors.

570368

Trip gas summary

MD (mRT)	MWT (sg)	Trip Gas (%)	Background Gas (%)	Peak A.B.G %	Remarks
1348.0	1.06	1.38	0.40	1.00	Wiper trip
1944.0	1.08	0.40	0.20	0.20	Wash pipe
2008.0	1.09	0.60	0.10	0.50	Bit trip
2017.0	1.09	8.80	0.80	8.00	Bit trip
2220.0	1.10	0.60	0.20	0.40	TD - Wiper trip
2220.0	1.10	1.10	0.20	0.90	Wiper Trip 2
965.0	1.11	4.00	0.30	3.70	Reaming
2220.0	1.11	1.10	0.20	0.90	Circ TD

Deviation Summary

White Ibis-1 was drilled as a vertical appraisal well. Surveys while drilling were from an Anderdrift tool to TD. Multishot surveys were run at 863 m and at TD 2220 mRT. A List is provided below the Anderdrift surveys.

MD (mRT)	Inclination (deg)	Azimuth (deg)	Tool Type
103.0	1.00	n/a	Anderdrift
113.0	0.00	n/a	Anderdrift
124.0	2.50	n/a	Anderdrift
128.0	1.50	n/a	Anderdrift
182.0	1.00	n/a	Anderdrift
221.0	1.50	n/a	Anderdrift
250.0	0.50	n/a	Anderdrift
279.0	1.50	n/a	Anderdrift
337.0	1.50	n/a	Anderdrift
394.0	1.00	n/a	Anderdrift
451.0	0.00	n/a	Anderdrift
508.0	1.00	n/a	Anderdrift
565.0	1.00	n/a	Anderdrift
623.0	0.00	n/a	Anderdrift
656.0	0.00	n/a	Anderdrift
681.0	0.00	n/a	Anderdrift
710.0	0.00	n/a	Anderdrift
738.0	0.00	n/a	Anderdrift
766.0	0.00	n/a	Anderdrift
795.0	0.00	n/a	Anderdrift
823.0	0.00	n/a	Anderdrift
890.0	0.00	n/a	Anderdrift
919.0	0.00	n/a	Anderdrift
948.0	0.00	n/a	Anderdrift
963.0	0.00	n/a	Anderdrift

570369

991.0	0.00	n/a	Anderdrift
MD (mRT)	Inclination (deg)	Azimuth (deg)	Tool Type
1022.0	0.00	n/a	Anderdrift
1050.0	0.00	n/a	Anderdrift
1078.0	0.00	n/a	Anderdrift
1107.0	0.00	n/a	Anderdrift
1136.0	0.00	n/a	Anderdrift
1164.0	0.50	n/a	Anderdrift
1222.0	1.00	n/a	Anderdrift
1251.0	0.50	n/a	Anderdrift
1308.0	0.50	n/a	Anderdrift
1372.0	0.50	n/a	Anderdrift
1422.0	0.50	n/a	Anderdrift
1479.0	1.00	n/a	Anderdrift
1594.0	0.00	n/a	Anderdrift
1680.0	0.50	n/a	Anderdrift
1768.0	0.50	n/a	Anderdrift
1852.0	1.00	n/a	Anderdrift
1932.0	0.00	n/a	Anderdrift
1994.0	0.50	n/a	Anderdrift

570370

Drilling Phase Summary - 914 mm hole section

Dates	: 1 - 3 June 1998
Measured depth	: 74.5 m to 131.97 m
Vertical TD	: 74.5 m to 131.97 m
Number of bits used	: 1
Mud type	: Seawater with high viscosity sweeps

A conventional 660 mm bottom hole assembly, including 660 mm Bit #1 with a 914 mm hole opener, was made up and lowered to the seabed in 62.0 m of water plus 12.5 metres of rig air gap relative to LAT. The 914 mm surface hole was drilled from 74.5 m to the 762 mm casing point at 131.97 m using seawater and pumping high viscosity sweeps as needed. A 35 bbl sweep of guar gum was pumped, an Anderdrift survey taken, followed by 100 bbl of high viscosity gel mud. The drill string was then pulled out, then run in to bottom again at 132.0 m. The hole was displaced with gel mud, a Totco survey was run (Misrun), then the string was pulled out of hole to run and cement the 762 mm casing as per Premier's programme with the shoe at 130.6 m.

Bit Record

BIT #	SIZE mm	MAKE	TYPE	JETS	IN m	OUT m	RUN m	HRS	GRADING
1RR + HO	660 914	HTC	CR 1	3 x 22 1 x 20 3x18	74.5	132.0	57.5	3.25	1-1-NO-A-1-I-NO-TD

570371

Drilling Phase Summary - 445 mm

Dates	: 3rd - 5th June 1998
Measured depth	: 132 m to 862.0 m
Vertical TD	: 132 m to 862.0 m
Number of bits used	: 2 (1 for cement drilling)
Mud type	: Seawater and Guargum sweeps

Bit # 1RR2 was run into the hole with a conventional vertical assembly to drill out the cement & 762 mm shoe at 130.6 m and one metre of new formation, before being pulled out of the hole and replaced with a 445 mm, Bit # 2. New hole was drilled from 133 m to 866 m with surveys & 35 bbl guar gum sweeps every connection. Electronic Multi-Shot survey was run at TD to surface.

At TD a 100 bbl hi-vis pill was pumped to circulate the hole clean before displacing the hole with 960 bbl of gel mud and dropping the EMS for surveys. Upon pulling out of the hole 3-5 K of drag and overpull at 743 m of 35K was encountered. The pipe was worked to 686 m, 75-80 K overpull. The pipe was run in the hole and washed and reamed from 686 m to 743 m. The hole was backreamed from 743 m to 660 m with high torque noted at 673 m. The string was pulled to the shoe, the EMS was retrieved and the string was run in to 824 m where it was held up, 35-40K. The string was washed and reamed to bottom, the hole circulated, 230 bbl guar gum sweep was circulated out before displacing to 1.14 sg mud. The pipe was pulled, tight at 854 m, 50-60 K overpull, before pulling out of the hole. 340 mm casing was run as per Premier's programme with the shoe set at 860 m.

Bit Record

BIT #	SIZE mm	MAKE	TYPE	JETS	IN m	OUT m	RUN m	HRS	GRADING
1RR2	660	HTC	CR 1	3 x 22 1 x 20	132.0	133.0	1.0	1.0	1-1-NO-A-2-I-NO-BHA
2	444	HTC	GTX-C1	3x18 1x16	133.0	866.0	733.0	18.7	1-1-NO-1/2/3-8-I-NO-TD

570372

Drilling Phase Summary - 311 mm

Dates	: 6 th- June 1998
Measured depth	: 865.0 m to 2220 mRT
Vertical TD	: 865.0 m to 2219.94 mTVD
Number of bits used	: 3
Mud type	: KCL IDBOND

After running and testing the BOP's, 311 mm, PDC Bit #3 (BHA #4) was run into the hole with a conventional packed assembly, then washed from 777 m to the top of the cement at 834 m. Cement was drilled for 8.3 hours before encountering the 340 mm casing shoe at 863 m. The hole was displaced with 450 bbls to a 1.1 sg KCL water based mud system. New hole was drilled to 869 m. A Formation Integrity test was conducted. The result was an Equivalent mud weight of 14.16 sg.

Drilling with a PDC bit (#3, Hughes, BD536HD, 2x16,2x15,2x12) and a mud motor a relatively quick and constant penetration was achieved through the dominantly soft to firm Claystones interbedded with minor Limestones and Siltstones. This first session of drilling the 311 mm hole attained a depth of 1348 m BRT TMD before bad weather stopped proceedings at 16.00 hrs on the 11th of June. The average penetration rate was 42.2 m/hr obtained with an average flow rate of 1000 gpm. The RPM utilised was 256 with 180 of this being contributed by the downhole motor, with the remainder being surface rotary.

The hydraulics seemed close to optimum with the cuttings flowing constantly out of the well with an average stand pipe pressure of 2580 psi. A 9.1 ppg water based mud was used. Some mud loss over the shakers was unavoidable due to the sometimes considerable rocking and pitching of the Northern Explorer III drillship. This section of the well was drilled almost straight with most surveys being 0 degrees and the maximum being 1 degree.

Geologically the samples were as expected of the Torquay Group. This section exhibited the dominant claystone from 870 to 1348m. Interbeds of fine grained Limestones and argillaceous Siltstones were also noticed together with a minor amount of very fine grained glauconitic sandstone.

Continuous monitoring of gas detected no unexpected or large amounts of gas. The average and fairly constant gas trace being methane (C1) at between 0.2 and 0.6 %.

No hydrocarbon shows were detected by observation of samples under ultra-violet light. There was no fluorescence in the Torquay Group cuttings.

Drilling commenced at 22:30 hours while weather conditions were favourable, trip gas reached 1.0% ABG. Mud losses continued mainly via the shakers with the pitch & roll of the ship. Losses increased while drilling sands from 1730 m, lost circulation material was added from 1800 m to reduce losses down hole. At 1944m a pressure loss of 600 psi over 2 hours was detected. A hole was detected in the 8 th stand pulled from the hole. The washed pipe was laid out and replaced and drilling resumed with the correct pressure.

At 1978 m pump pressure dropped 300 psi, after checking surface lines and pumps the fault was blamed on the motor, drilling continued with pressure stabilising. Drilling stopped at 1989 m after a drilling break to circulate up samples. At 1983 m a 10.4 % gas peak was recorded dropping to 2% before peaking at 4.3% at 1987 m. The sample contained 10-20% very fine silty-argillaceous sand. Drilling continued, while looking for another drill break and good sands to core. At 2008m bottoms up was circulated up with a 4 metre drill break, gas peaked at 45 % with good clean fine-medium grained sands. The string was pulled out of the hole ready to cut a 18 m core.

A Corpro core bit (CM 365, TFA 1.15"2), barrell, and two bumper subs were made up at 13:00 hours 15/6/98. Due to poor weather conditions the core string was hung off until better weather to run and drill the core. At 22:00 hours 15/6/98 the core barrel was run in the hole, at 900 m just out of the shoe tight hole was experienced and each stand had to be reamed down, losses averaged 15 bbl/hour while circulating. At 2000 m bottoms up was circulated with 0.6 % trip gas, 10% CO2 & trace to 13 ppm recorded in the mud. A total of 9 metres of core was cut before the rig heaved the string off bottom. Upon reaching bottom again the bit would not drill & the string was POOH. On surface a total of 0.72 m of core was recovered, 100 % Sandstone, fine to coarse with trace fluorescence.

BHA # 6, with Bit # 5, MAX GT-PS09 with 3 x 14 jets was made up and run in the hole, reaming the last stand to bottom. Trip gas was 8.0 % above background gas. High gas readings were recorded as drilling continued. At 2061 m a 4 metre drill break was encountered as a possible coring zone, bottoms up was circulated with a 15 % gas peak recorded. Due to no seal being above the sand ie: Claystone, it was decided to drill ahead. Mud losses ranged from 5-10 bbl/hr while drilling. Basement was entered at 2173 m a metamorphic lithology which was drilled to a TD of 2220 m MD RT (2219.94 mTVD) @ 00:30 hours on the 19-6-98. At TD a wiper trip back to 1606 m (11 stands) was undertaken. The hole needed reaming due to overpull between 50 and 70 klbs, constantly present from 2170 m to 1606 m where it dropped to 20-30 klb overpull. The string was run back to bottom, reaming the last stand and circulating bottoms up, no fill, before commencing pulling out at 12:00 hrs 19/6/1998. No hole problems upon pulling out of the hole, schlumberger logging was set up and tools run in the hole. Logging tools were unable to run down past 936 mRt so a wiper trip was done to clean the hole and ream any tight sections. The amount of cuttings that unloaded from the hole during reaming while doing the full wiper trip was very significant and explained why the logging tools had difficulty moving down the hole on the first attempt. Cuttings poured over the top scalper screen for 2 hours at 700 gpm rate. Why were so many cubic metres of cuttings still in the hole? Was the mud in optimal condition to carry the cuttings from the hole and up the riser during the later stages of drilling? These are matters which could be addressed in a post well analysis. The full wiper trip was delayed for 10 hours. Hung off and waited on the weather from 00.00 hrs to 10.00 hrs 21/6/98 with the string inside the top shoe (863m).

Re-attached to well and ran in hole reaming from 925 metres until clean and running down to bottom, reaming the last few stands. Cuttings at the shakers consisted mainly of re-circulated cuttings in a conglomeritic form and rounded, dominantly Claystone and Siltstone lithology. The string was pulled after circulating the hole clean, tight hole and swabbing occurred after 2100 metres. The hole was circulated before pulling out to 1180 metres where the hole swabbed again. The stands were backreamed and hole circulated at 00:30 hours on the 22-6-98 back to the shoe at 863 mRT where bottoms up was circulated and the string pulled out of the hole.

Logging tools were again unable to pass 927 m so a final wiper trip was done to 2220 m TD, reaming any tight spots to 1400m. On bottom a 100 bbl hi vis pill was pumped to clean the hole, the pill came to surface 3400 strokes late (40% O/G) with dominantly large rounded Claystone cuttings. Another 200 bbl hi-vis was spotted on bottom before pulling out of the hole. Maximum overpull pulling out was 30 Klb. Logging tools were run in the hole but were unable to pass 1048 mRT. 9 5/8" casing was run in the hole to 1878 m & cemented before drilling out with a 8 1/2" bit and cleaning the hole for logging.

The well was plugged and abandoned with cement plugs set as per Premiers programme.

1. Bit Record

BIT #	SIZE mm	MAKE	TYPE	JETS	IN m	OUT m	RUN m	HRS	GRADING
3	311	Hughes	BD536	2x16 2x15 2x12	866.0	2008.0	1142.0	41.8	1-2-CT-BT-C-X-1/16-PN-CP
4	311	CORPRO	CM365	1.15 TFA	2008	2017.0	9.0	0.71	5% WORN - 1/16 U/G
5	311	Hughes	MAX GT-PS09	3x14	2017	.0	.0		1-2-BT-G3-E-I-CT-TD

2. Mud Record

Depth m	MW sg	FV sec/qt	PV cps	YP lb/100ft	Gels	WL	Solids %	Sand %	pH	Chlorides ppm	Ca2+ mg/l	KCl %	Cake 32/"
866	1.07	72	14	27	6/7	13		-	9.5	51,000	120.2	-	1
965	1.07	49	11	21	4/5	6.6	1.9	0.2	9.5	48,000	200.4	6	1
1348	1.06	50	11	24	5/6	6.4	1.6	0.2	9.0	45,000	240.5	6	1
1349	1.06	55	11	24	5/6	6.4	1.6	0.2	9.0	45,000	240.5	6	1
1833	1.08	47	13	25	5/7	5.8	2.0	0.2	9.0	41,000	440.9	5	1
1991	1.09	52	15	33	7/10	5.4	3.5	0.2	9.0	42,000	480.9	6	1
2008	1.09	56	15	33	7/11	5.4	3.5	0.2	9.0	42,000	480.9	6	1
2017	1.09	49	13	24	6/9	5.2	3.5	0.2	9.0	42,000	440.9	6	1
2049	1.09	42	11	21	6/9	5.2	3.5	0.1	8.9	42,000	480.9	6	1
2210	1.1	41	11	21	6/10	5.0	3.9	0.1	9.0	43,000	440.9	6	1
2220	1.1	41	11	25	6/9	5.0	3.9	0.1	8.9	43,000	440.9	6	1
2220	1.1	45	12	22	6/10	5.2	3.9	0.1	9.0	43,000	480.9	6	1

WHITE HAVEN 3 DRILLED

5 cm

PremierOil
Australasia

870555

OVERPRESSURE LOG

geoservices
Weatherford

PROG (ab) 100 TD (ab) 3300 SCALE 1/ 1000

Well name : WHITE HAVEN 3
Company name : PREMIER OIL
Rig name : H.ERICSSON 4
Rig Type : SEMI - SUB
Rig floor (m) 23.5 RT
Water depth (m) 113 Rotary (m) 23.5 RT
Kelly bushing (m) 23.5 RT
Elevation (m) 23.5 RT
Permanent datum : AHD
Total depth : at 3310m
Ground level (m) 113
Casing shoe : 13 3/8 @ 1000m
Fluids : gel/wat / 1.04 sg
Fracture grad. 1.04
Pore 1.03
Drilling fluid type : GEL/WATER
Density (sg) 1.04 - 1.05
Viscosity 40 - 50
Chlorides 30000 - 40000
Gas
Oil
Generated by XLS Package

BCP (MPa)

DXP/DENSITY
Overpressure
Hydrostatic

MW in
ECD
P Frac

LITHOLOGY

TEMPERATURE
°C

TOTAL GAS
%

RESISTIVITY
ohm.m

Drilling Break

Connection Gas

Trip Gas

Wiper Trip Gas

APPENDIX 12

FLUID RESERVOIR STUDY

By

PETROLAB

WHITE IBIS 1

570377

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis # 1 File : P 98045

INDEX

	Page
Summary Of Results	1
Field Characteristics	2
Sample Transfers	3
Compositional Analyses	4 - 7
Constant Mass Study	8 - 9
Constant Volume Depletion Study	10
Produced Wellstreams During Depletion Study	11 - 13
Calculated Retrograde Liquid Compositions	14 - 16
Cumulative Recovery Calculations	17
PLOTS:	
Relative Volume	18
Gas Formation Volume Factor	19
Gas Expansion Factor	20
Gas Deviation Factor	21
Specific Volume of Reservoir Fluid	22
Viscosity of Reservoir Fluid	23
Retrograde Liquid Deposit	24
GPM Content in Produced Wellstream	25
Stock Tank Liquid in Produced Wellstream	26
Cumulative Volumes Produced	27
Cumulative Stock Tank Liquid Production	28
Plant Products in Produced Wellstreams	29
Plant Products in Primary Separator Gas	30
Gas Recovery Factor	31

570378

PETROLAB

Company : Premier Oil Australia Pty. Ltd.	Page : 1 of 31
Well : White Ibis # 1	File : P 98045

SUMMARY OF RESULTS

SATURATED VAPOUR:

Reservoir Temperature (°F)	:	226
Dew Point Pressure (psig)	:	3827
Gas Formation Volume Factor (Bg)	:	0.00455
Gas Expansion Factor (E)	:	219.80
Gas Deviation Factor (Z)	:	0.901
Specific Volume (CFT/LB)	:	0.06372
Density (gm/cc)	:	0.2514
Viscosity (centipoise)	:	0.0265
Molecular Weight	:	27.11
Gas Gravity (Air = 1.000)	:	0.940
Gross Heating Value (BTU/ft3)	:	1378

Total Plant Products in Dew Point Fluid (GPMM):

Ethane	:	1566
Propane	:	979
Butanes	:	959
Pentanes Plus	:	2930

FLASH DATA:

1st Separator Pressure (psig)	:	1500
1st Separator Temperature (°F)	:	100
2nd Separator Pressure (psig)	:	500
2nd Separator Temperature (°F)	:	80
Stock Tank Pressure (psig)	:	0
Stock Tank Temperature (°F)	:	60
1st Separator GOR (scf/bbl)	:	13464
2nd Separator GOR (scf/bbl)	:	501
Stock Tank GOR (scf/bbl)	:	611
Total GOR (scf/bbl)	:	14576
1st Separator Gas / Produced WS (mscf/mmscf)	:	868.00
2nd Separator Gas / Produced WS (mscf/mmscf)	:	32.00
STT Gas / Produced WS (mscf/mmscf)	:	39.00
Total Gas / Produced WS (mscf/mmscf)	:	939.00
ST T Liquid / Produced W/S (stb/mmscf)	:	64.00

Total Plant Products in Primary Separator Gas (GPMM):

Ethane	:	1336
Propane	:	705
Butanes	:	534
Pentanes Plus	:	401

Total Plant Products in Secondary Separator Gas (GPMM):

Ethane	:	65
Propane	:	32
Butanes	:	20
Pentanes Plus	:	10

Total Plant Products in Stock Tank Gas (GPMM):

Ethane	:	150
Propane	:	193
Butanes	:	224
Pentanes Plus	:	159

PETROLAB

570379

Company : Premier Oil Australia Pty. Ltd.	Page : 2 of 31
Well : White Ibis # 1	File : P 98045

FIELD CHARACTERISTICS :

Field Name	:	White Ibis #1
Formation Name	:	–
Pool (or Zone)	:	–
Date first well completed	:	–
Original reservoir pressure (psig)	:	–
@ datum (m ss)	:	–

WELL CHARACTERISTICS :

Depth datum (m)	:	2015.2
Elevation above MSL (m)	:	
Total depth (m PBTD)	:	
Producing interval (mAHBRT)	:	
Perforated intervals (m KB)	:	
Tubing size (inch)	:	
Tubing shoe (m)	:	
Casing size (inch)	:	
Reservoir temperature (°F)	:	226
Last reservoir pressure (psia)	:	
@ datum (m KB)	:	
date	:	
Status of well	:	

BOTTOM HOLE SAMPLING CONDITIONS :

MDT Chamber #	:	MRSC - BB - 120	MRSC - BB - 139
Transferred to Petrolab Cylinder #	:	L-011, L-163 & L-076	L-013, L-015 & L-409
Date sampled	:		
Choke size (inch)	:		
Tubing head pressure (psig)	:		
Tubing head temperature (°F)	:		
Flowing bottom hole pressure (psia)	:		
Separator pressure (psig)	:		
Separator temperature (°F)	:		
Liquid rate (stbbl/day)	:		
Gas rate (scf/day)	:		
Pressure base (psia)	:		
Temperature base (°F)	:		
Compressibility factor (Fpv)	:		
Field gas gravity (air=1.000)	:		
Gas gravity factor (Fg)	:		
Produced field CGR (stbbl/mmscf)	:		
Produced field GLR (scf/stbbl)			
Lab Compressibility factor (Fpv)	:		
Lab Gas gravity factor (Fg)	:		
Corrected GLR (scf/stbbl)			
Sampled by	:	Schlumberger	

TRANSFER DETAILS

MDT Chamber #:	MRSC-BB-139
Chamber Size:	1 Gallon
Transfer Date:	July 06,1998
Sample Depth:	2015.2 m
Opening Pressure:	1640 psig
Transfer Temperature:	58 ° F

Chamber compressed to 5000 psig with approximately 2275 cc's of water behind piston.

Three * 600 cc's of reservoir fluid were transferred out in single phase at 5000 psig into Petrolab cylinders numbers:

L-013
L-015
L-409

MDT Chamber #:	MRSC-BB-120
Chamber Size:	1 Gallon
Transfer Date:	July 06,1998
Sample Depth:	2048.5 m
Opening Pressure:	1600 psig
Transfer Temperature:	59 ° F

Chamber compressed to 5000 psig with approximately 2250 cc's of water behind piston.

Three * 600 cc's of reservoir fluid were transferred out in single phase at 5000 psig into Petrolab cylinders numbers:

L-011
L-163
L-076

The remainder was flashed off and approximately 250 cc of water was recovered

PETROLAB

570381

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

COMPOSITIONAL ANALYSIS OF BOTTOM HOLE SAMPLE
L-011 Depth 2048.5 m From MRSC-BB-120

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	0.00	8.09	8.09
Nitrogen	N2	0.00	1.91	1.91
Methane	C1	0.00	77.92	77.92
Ethane	C2	0.00	5.99	5.99
Propane	C3	0.00	2.36	2.36
Iso-Butane	iC4	0.00	0.76	0.76
N-Butane	nC4	0.00	0.81	0.81
Iso-Pentane	iC5	0.00	0.45	0.45
N-Pentane	nC5	0.00	0.28	0.28
Hexanes	C6	0.00	0.64	0.64
Heptanes	C7	0.00	0.52	0.52
Octanes	C8	0.00	0.17	0.17
Nonanes	C9	0.00	0.08	0.08
Decanes	C10	0.00	0.02	0.02
Undecanes	C11	0.00	0.00	0.00
Dodecanes Plus	C12+	0.00	0.00	0.00
TOTAL		100.00	100.00	100.00

Ratios				
Molar Ratio	:	0.0000	1.0000	1.0000
Mass Ratio	:	0.0000	1.0000	1.0000
Liquid Ratio (bbl/bbl)	:	1.0000 @ SC	–	–
Gas Liquid Ratio	:	1.0000 bbl @ SC	SCF	–
Stream Properties				
Molecular Weight	:	–	22.22	22.22
Density obs. (gm/cc)	:	– @ 60 °F	–	–
Gravity (AIR = 1.000)	:	– °API @ 60 °F	0.770	0.770
GHV (BTU/scf)	:	–	1113	1113
Hexanes Plus Properties				
Mol %	:	0.00	1.43	1.43
Molecular Weight	:	–	93.9	93.9
Density (gm/cc @ 60 °F)	:	–	0.6807	0.6807
Gravity (°API @ 60 °F)	:	–	76.2	76.2
Heptanes Plus Properties				
Mol %	:	0.00	0.79	0.79
Molecular Weight	:	–	101.9	101.9
Density (gm/cc @ 60 °F)	:	–	0.6915	0.6915
Gravity (°API @ 60 °F)	:	–	72.9	72.9
Decanes Plus Properties				
Mol %	:	0.00	0.02	0.02
Molecular Weight	:	–	84.0	84.0
Density (gm/cc @ 60 °F)	:	–	0.6661	0.6661
Gravity (°API @ 60 °F)	:	–	80.7	80.7
Undecanes Plus Properties				
Mol %	:	0.00	0.00	0.00
Molecular Weight	:	–	–	–
Density (gm/cc @ 60 °F)	:	–	–	–
Gravity (°API @ 60 °F)	:	–	–	–
Dodecanes Plus Properties				
Mol %	:	0.00	0.00	0.00
Molecular Weight	:	–	–	–
Density (gm/cc @ 60 °F)	:	–	–	–
Gravity (°API @ 60 °F)	:	–	–	–

* (P)ressure : 6000 psig * (T)emperature : 78 °F

FINGERPRINT ANALYSIS
BY CAPILLARY GAS CHROMATOGRAPHY
L-013 Depth 2015.2 m From MRSC-BB-139

Component		% Molar
Hexanes minus	C6-	2.11
Hexanes	C6	5.98
Heptanes	C7	21.33
Octanes	C8	18.23
Nonanes	C9	16.34
Decanes	C10	12.70
Undecanes	C11	7.67
Dodecanes	C12	4.66
Tridecanes	C13	3.81
Tetradecanes	C14	2.37
Pentadecanes	C15	1.80
Hexadecanes	C16	0.92
Heptadecanes	C17	1.04
Octadecanes	C18	0.33
Nonadecanes	C19	0.27
Eicosanes	C20	0.13
Heneicosanes	C21	0.08
Docosanes	C22	0.05
Tricosanes	C23	0.04
Tetracosanes	C24	0.02
Pentacosanes	C25	0.02
Hexacosanes	C26	0.02
Heptacosanes	C27	0.02
Octacosanes	C28	0.02
Nonacosanes	C29	0.01
Triacontanes	C30	0.01
Hentriacontanes	C31	0.01
Dotriacontanes	C32	0.01
Tritriacontanes	C33	0.00
Tetratriacontanes	C34	0.00
Pentatriacontanes Plus	C35+	0.00
TOTAL		100.00

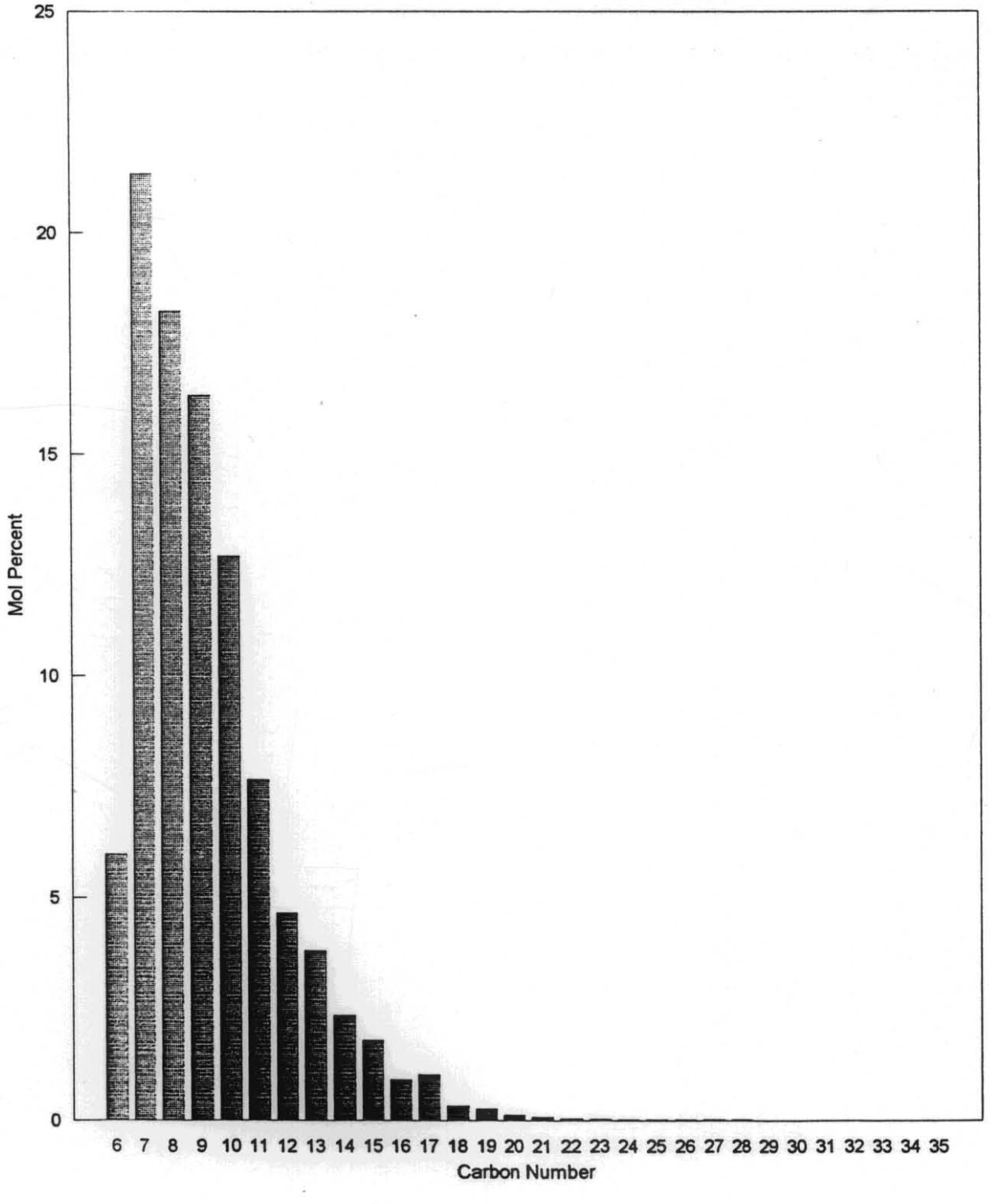
Molecular Weight Calculated *	:	125.5
Density @ 60 °F Calculated *	:	0.7645
Molecular Weight Measured	:	
Density @ 60 °F Measured	:	0.7610

*Calculation based on generalized properties as published by Katz and Firoozabadi

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

FINGERPRINT ANALYSIS
BY CAPILLARY GAS CHROMATOGRAPHY
L-013 Depth 2015.2 m From MRSC-BB-139



PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

COMPOSITIONAL ANALYSIS OF BOTTOM HOLE SAMPLE
L-013 Depth 2015.2 m From MRSC-BB-139

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	0.13	8.16	8.00
Nitrogen	N2	0.00	1.97	1.93
Methane	C1	0.44	72.33	70.92
Ethane	C2	0.23	5.96	5.85
Propane	C3	0.51	3.61	3.55
Iso-Butane	iC4	0.59	1.63	1.61
N-Butane	nC4	0.73	1.38	1.37
Iso-Pentane	iC5	1.40	0.97	0.98
N-Pentane	nC5	1.29	0.69	0.70
Hexanes	C6	5.78	1.32	1.41
Heptanes	C7	20.63	1.29	1.67
Octanes	C8	17.63	0.43	0.77
Nonanes	C9	15.81	0.18	0.49
Decanes	C10	12.29	0.07	0.31
Undecanes	C11	7.42	0.01	0.16
Dodecanes Plus	C12+	15.13	0.00	0.28
TOTAL		100.00	100.00	100.00
Ratios				
Molar Ratio	:	0.0196	0.9804	1.0000
Mass Ratio	:	0.0881	0.9119	1.0000
Liquid Ratio (bbl/bbl)	:	1.0000 @ SC	–	–
Gas Liquid Ratio	:	1.0000 bbl @ SC	41551 SCF	–
Stream Properties				
Molecular Weight	:	122.0	25.21	27.11
Density obs. (gm/cc)	:	0.7610 @ 60 °F	–	–
Gravity (AIR = 1.000)	:	54.3 °API @ 60 °F	0.874	–
GHV (BTU/scf)	:	–	1272	–
Hexanes Plus Properties				
Mol %	:	94.69	3.30	5.09
Molecular Weight	:	125.5	95.0	106.1
Density (gm/cc @ 60 °F)	:	0.7672	0.6823	0.7164
Gravity (°API @ 60 °F)	:	52.8	75.7	65.8
Heptanes Plus Properties				
Mol %	:	88.91	1.98	3.68
Molecular Weight	:	128.2	102.3	114.5
Density (gm/cc @ 60 °F)	:	0.7711	0.6921	0.7318
Gravity (°API @ 60 °F)	:	51.8	72.8	61.7
Decanes Plus Properties				
Mol %	:	34.83	0.08	0.75
Molecular Weight	:	161.4	84.0	144.7
Density (gm/cc @ 60 °F)	:	0.8023	0.6661	0.8023
Gravity (°API @ 60 °F)	:	44.7	80.7	44.7
Undecanes Plus Properties				
Mol %	:	22.55	0.01	0.44
Molecular Weight	:	176.3	147.0	172.5
Density (gm/cc @ 60 °F)	:	0.8128	0.7400	0.8128
Gravity (°API @ 60 °F)	:	42.4	59.5	42.4
Dodecanes Plus Properties				
Mol %	:	15.13	0.00	0.28
Molecular Weight	:	190.7	–	190.7
Density (gm/cc @ 60 °F)	:	0.8222	–	0.8222
Gravity (°API @ 60 °F)	:	40.4	–	40.4

* (P)ressure : 3827 psig * (T)emperature : 226 °F

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

CONSTANT MASS STUDY
@ 226 °F
L-013 Depth 2015.2 m From MRSC-BB-139

Pressure (psig)	Relative Volume (V/Vsat) (1)	Formation Volume Factor (Bg) (2)	Gas Expansion Factor (E) (3)	Deviation Factor (Z)	Specific Volume (CFT/LB)	Gas Viscosity (Centipoise) (4)
6000	0.7761	0.00353	283.20	1.095	0.04945	0.0412
5750	0.7923	0.00360	277.41	1.071	0.05048	0.0399
5500	0.8094	0.00368	271.55	1.047	0.05157	0.0386
5250	0.8290	0.00377	265.14	1.024	0.05282	0.0373
5000	0.8511	0.00387	258.26	1.001	0.05423	0.0360
4750	0.8762	0.00399	250.86	0.979	0.05583	0.0346
4500	0.9045	0.00412	243.01	0.958	0.05763	0.0332
4250	0.9372	0.00426	234.52	0.937	0.05972	0.0317
4000	0.9737	0.00443	225.73	0.917	0.06204	0.0303
3827 *	1.0000	0.00455	219.80	0.901	0.06372	0.0294

* Dew Point Pressure

(1) Cubic feet of gas at indicated pressure and temperature per cubic foot at reservoir pressure
(2) Cubic feet of gas at indicated pressure and temperature per cubic foot at 14.696 psia and 60 °F
(3) Cubic feet of gas at 14.696 psia and 60 °F per cubic foot at indicated pressure and temperature
(4) Calculated from correlation of Lee, Gonzales and Eakin

PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

CONSTANT MASS STUDY
@ 226 °F
L-013 Depth 2015.2 m From MRSC-BB-139

Pressure (psig)	Relative Volume (V/Vsat) (1)	Retrograde Liquid Deposit (Bbl/MMSCF) (2)	(Volume%) (3)
3827 *	1.0000	0.00	0.00
3754	1.0149	0.36	0.04
3615	1.0442	0.71	0.09
3361	1.1032	0.95	0.12
3083	1.1845	1.30	0.16
2797	1.2881	2.68	0.33
2491	1.4366	9.92	1.22
2083	1.7237	22.07	2.72
1565	2.3289	28.04	3.46
1291	2.8507	28.95	3.57
980	3.8043	28.44	3.51
650	5.9015	27.39	3.38

* Dew Point Pressure

(1) Cubic feet of gas at indicated pressure and temperature per cubic foot at saturation pressure
(2) Barrels of liquid at indicated pressure and temperature per MMSCF of original reservoir fluid
(3) Percent of reservoir hydrocarbon pore space at dew point

CONSTANT VOLUME DEPLETION STUDY
@ 226 °F
L-013 Depth 2015.2 m From MRSC-BB-139

Pressure (psig)		Cumulative Produced Fluid (1)	Deviation Factor (Z) Liberated Gas	Deviation Factor (Z) Two Phase	Gas Viscosity (Centipoise)	Retrograde Liquid (Bbl/MMSCF) (2)	Retrograde Liquid (Vol.%) (3)
3827	*	0.000	0.901	0.901	0.0295	0.00	0.00
3500		6.433	0.873	0.868	0.0275	1.01	0.12
3050		16.689	0.844	0.863	0.0253	2.74	0.34
2600		28.279	0.838	0.855	0.0221	6.60	0.81
2150		40.886	0.857	0.859	0.0191	14.27	1.76
1700		53.655	0.880	0.868	0.0169	19.06	2.35
1250		66.289	0.908	0.880	0.0152	20.93	2.58
800		78.748	0.940	0.899	0.0140	19.28	2.38
350		90.690	0.972	0.919	0.0131	15.74	1.94

* Dew Point Pressure

(1) Wellstream produced : Cumulative volume percent of initial fluid
(2) Barrels of liquid at indicated pressure and temperature per MMSCF of original reservoir fluid
(3) Percent of reservoir hydrocarbon pore space at dew point

WELLSTREAM COMPOSITIONS PRODUCED DURING CONSTANT VOLUME DEPLETION

Pressure (psig):		3827 *	3500	3050
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	8.00	8.00	8.00
Nitrogen	N2	1.93	1.93	1.93
Methane	C1	70.92	70.94	70.98
Ethane	C2	5.85	5.85	5.85
Propane	C3	3.55	3.55	3.55
Iso-Butane	iC4	1.61	1.61	1.61
N-Butane	nC4	1.37	1.37	1.37
Iso-Pentane	iC5	0.98	0.98	0.98
N-Pentane	nC5	0.70	0.70	0.70
Hexanes	C6	1.41	1.41	1.40
Heptanes	C7	1.67	1.74	1.76
Octanes	C8	0.77	0.75	0.77
Nonanes	C9	0.49	0.47	0.46
Decanes	C10	0.31	0.30	0.28
Undecanes	C11	0.16	0.14	0.14
Dodecanes Plus	C12+	0.28	0.26	0.22
TOTAL		100.00	100.00	100.00
Stream Properties				
Molecular Weight	:	46.25	27.02	26.95
Gravity (AIR = 1.000)	:	0.940	0.938	0.935
Gross HV (BTU/SCF)	:	1378	1374	1370
Nett HV (BTU/SCF)	:	1256	1252	1248
Wobbe Index	:	1421	1419	1417
Critical Pressure (psia)	:	675.2	675.3	675.5
Critical Temperature (°R)	:	434.2	433.9	433.6
G P M Content				
Ethane Plus	:	6.434	6.409	6.377
Propane Plus	:	4.868	4.843	4.811
Butanes Plus	:	3.889	3.864	3.832
Pentanes Plus	:	2.930	2.905	2.873
Hexanes Plus Properties				
Mol %	:	5.09	5.07	5.03
Molecular Weight	:	106.1	104.8	104.0
Density (gm/cc @ 60 °F)	:	0.7164	0.7405	0.7395
Gravity (°API @ 60 °F)	:	65.8	59.4	59.7
Heptanes Plus Properties				
Mol %	:	3.68	3.66	3.63
Molecular Weight	:	114.5	112.8	111.7
Density (gm/cc @ 60 °F)	:	0.7318	0.7504	0.7491
Gravity (°API @ 60 °F)	:	61.7	56.9	57.2
Decanes Plus Properties				
Mol %	:	0.75	0.70	0.64
Molecular Weight	:	144.7	155.4	154.1
Density (gm/cc @ 60 °F)	:	0.8023	0.7948	0.7936
Gravity (°API @ 60 °F)	:	44.7	46.4	46.6
Undecanes Plus Properties				
Mol %	:	0.44	0.40	0.36
Molecular Weight	:	172.5	171.4	169.7
Density (gm/cc @ 60 °F)	:	0.8128	0.8089	0.8074
Gravity (°API @ 60 °F)	:	42.4	43.3	43.6
Dodecanes Plus Properties				
Molecular Weight	:	190.7	184.6	184.2
Density (gm/cc @ 60 °F)	:	0.8222	0.8197	0.8194
Gravity (°API @ 60 °F)	:	40.4	41.0	41.0
Recovery Factor*				
* at 500 psi abandonment pressure	:	0.8752	0.8678	0.8534

* Original Reservoir Fluid

PETROLAB

570389

Company: Premier Oil Australia Pty. Ltd.
Well : White Ibis # 1

WELLSTREAM COMPOSITIONS PRODUCED DURING CONSTANT VOLUME DEPLETION

Pressure (psig):		2600	2150	1700
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	8.01	8.04	8.11
Nitrogen	N2	1.93	1.93	1.94
Methane	C1	71.11	71.41	72.15
Ethane	C2	5.85	5.86	5.89
Propane	C3	3.54	3.54	3.53
Iso-Butane	iC4	1.60	1.59	1.57
N-Butane	nC4	1.36	1.35	1.33
Iso-Pentane	iC5	0.97	0.96	0.93
N-Pentane	nC5	0.69	0.68	0.65
Hexanes	C6	1.39	1.35	1.24
Heptanes	C7	1.78	1.68	1.39
Octanes	C8	0.77	0.74	0.60
Nonanes	C9	0.45	0.43	0.34
Decanes	C10	0.25	0.22	0.17
Undecanes	C11	0.12	0.10	0.07
Dodecanes Plus	C12+	0.18	0.12	0.09
TOTAL		100.00	100.00	100.00
Stream Properties				
Molecular Weight	:	26.77	26.48	25.77
Gravity (AIR = 1.000)	:	0.929	0.918	0.894
Gross HV (BTU/SCF)	:	1360	1344	1303
Nett HV (BTU/SCF)	:	1239	1224	1186
Wobbe Index	:	1411	1402	1379
Critical Pressure (psia)	:	675.9	677.1	679.6
Critical Temperature (°R)	:	432.4	430.5	425.3
GPM Content				
Ethane Plus	:	6.289	6.140	5.769
Propane Plus	:	4.723	4.572	4.193
Butanes Plus	:	3.747	3.596	3.220
Pentanes Plus	:	2.794	2.649	2.286
Hexanes Plus Properties				
Mol %	:	4.94	4.64	3.90
Molecular Weight	:	102.7	101.9	100.6
Density (gm/cc @ 60 °F)	:	0.7379	0.7367	0.7352
Gravity (°API @ 60 °F)	:	60.1	60.4	60.8
Heptanes Plus Properties				
Mol %	:	3.55	3.29	2.66
Molecular Weight	:	110.1	109.2	108.4
Density (gm/cc @ 60 °F)	:	0.7471	0.7460	0.7450
Gravity (°API @ 60 °F)	:	57.7	58.0	58.2
Decanes Plus Properties				
Mol %	:	0.55	0.44	0.33
Molecular Weight	:	152.6	151.6	150.2
Density (gm/cc @ 60 °F)	:	0.7922	0.7913	0.7899
Gravity (°API @ 60 °F)	:	47.0	47.2	47.5
Undecanes Plus Properties				
Mol %	:	0.30	0.22	0.16
Molecular Weight	:	169.2	169.3	167.4
Density (gm/cc @ 60 °F)	:	0.8070	0.8071	0.8054
Gravity (°API @ 60 °F)	:	43.7	43.7	44.0
Dodecanes Plus Properties				
Molecular Weight	:	185.8	187.9	183.2
Density (gm/cc @ 60 °F)	:	0.8207	0.8223	0.8186
Gravity (°API @ 60 °F)	:	40.8	40.4	41.2
Recovery Factor*				
* at 500 psi abandonment pressure :		0.8294	0.7892	0.7270

PETROLAB

WELLSTREAM COMPOSITIONS PRODUCED DURING CONSTANT VOLUME DEPLETION

Pressure (psig):		1250	800	350
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	8.15	8.12	7.95
Nitrogen	N2	1.96	1.97	1.93
Methane	C1	72.56	72.02	70.15
Ethane	C2	5.92	5.93	5.86
Propane	C3	3.54	3.58	3.62
Iso-Butane	iC4	1.57	1.61	1.67
N-Butane	nC4	1.32	1.36	1.43
Iso-Pentane	iC5	0.91	0.95	1.05
N-Pentane	nC5	0.64	0.67	0.76
Hexanes	C6	1.19	1.27	1.57
Heptanes	C7	1.19	1.36	2.05
Octanes	C8	0.49	0.53	0.88
Nonanes	C9	0.30	0.37	0.62
Decanes	C10	0.14	0.15	0.29
Undecanes	C11	0.06	0.06	0.08
Dodecanes Plus	C12+	0.06	0.05	0.09
TOTAL		100.00	100.00	100.00
Stream Properties				
Molecular Weight	:	25.33	25.72	27.39
Gravity (AIR = 1.000)	:	0.878	0.892	0.950
Gross HV (BTU/SCF)	:	1278	1300	1395
Nett HV (BTU/SCF)	:	1163	1183	1272
Wobbe Index	:	1364	1377	1431
Critical Pressure (psia)	:	681.1	679.8	673.6
Critical Temperature (°R)	:	422.2	425.3	437.7
GPM Content				
Ethane Plus	:	5.546	5.773	6.668
Propane Plus	:	3.962	4.186	5.100
Butanes Plus	:	2.986	3.199	4.102
Pentanes Plus	:	2.055	2.243	3.104
Hexanes Plus Properties				
Mol %	:	3.43	3.79	5.58
Molecular Weight	:	99.5	99.6	101.0
Density (gm/cc @ 60 °F)	:	0.7336	0.7338	0.7357
Gravity (°API @ 60 °F)	:	61.2	61.2	60.7
Heptanes Plus Properties				
Mol %	:	2.24	2.52	4.01
Molecular Weight	:	107.7	107.4	107.7
Density (gm/cc @ 60 °F)	:	0.7441	0.7438	0.7442
Gravity (°API @ 60 °F)	:	58.5	58.6	58.5
Decanes Plus Properties				
Mol %	:	0.26	0.26	0.46
Molecular Weight	:	147.0	147.0	144.2
Density (gm/cc @ 60 °F)	:	0.7868	0.7869	0.7842
Gravity (°API @ 60 °F)	:	48.2	48.1	48.8
Undecanes Plus Properties				
Mol %	:	0.12	0.11	0.17
Molecular Weight	:	162.1	163.3	162.7
Density (gm/cc @ 60 °F)	:	0.8008	0.8019	0.8013
Gravity (°API @ 60 °F)	:	45.0	44.8	44.9
Dodecanes Plus Properties				
Molecular Weight	:	177.2	179.6	178.4
Density (gm/cc @ 60 °F)	:	0.8137	0.8157	0.8147
Gravity (°API @ 60 °F)	:	42.2	41.8	42.0
Recovery Factor*				
* at 500 psi abandonment pressure :		0.6175	0.3803	–

PETROLAB

CALCULATED RETROGRADE LIQUID COMPOSITIONS

Pressure (psig):		3500	3050	2600
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	6.42	5.80	5.21
Nitrogen	N2	1.93	1.92	1.88
Methane	C1	48.59	41.29	34.97
Ethane	C2	5.49	5.28	5.02
Propane	C3	4.19	4.39	4.54
Iso-Butane	iC4	2.26	2.53	2.78
N-Butane	nC4	2.03	2.33	2.62
Iso-Pentane	iC5	1.70	2.07	2.46
N-Pentane	nC5	1.28	1.58	1.91
Hexanes	C6	3.18	4.28	5.57
Heptanes Plus	C7+	22.93	28.53	33.04
TOTAL		100.00	100.00	100.00

Stream Properties

Molecular Weight	:	50.9	60.0	68.5
Density @ P & T	:	0.490	0.530	0.561

Hexanes Plus Properties

Mol %	:	26.11	32.81	38.61
Molecular Weight	:	120.9	125.7	130.2
Density (gm/cc @ 60 °F)	:	0.758	0.763	0.768
Gravity (°API @ 60 °F)	:	55.0	53.7	52.5

Heptanes Plus Properties

Molecular Weight	:	126.0	132.0	138.0
Density (gm/cc @ 60 °F)	:	0.765	0.772	0.778
Gravity (°API @ 60 °F)	:	53.2	51.7	50.2

CALCULATED RETROGRADE LIQUID COMPOSITIONS

Pressure (psig):		2150	1700	1250
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	4.62	4.00	3.29
Nitrogen	N2	1.76	1.49	1.05
Methane	C1	29.36	24.20	18.88
Ethane	C2	4.70	4.28	3.70
Propane	C3	4.59	4.48	4.15
Iso-Butane	iC4	2.98	3.05	2.98
N-Butane	nC4	2.86	2.97	2.95
Iso-Pentane	iC5	2.81	3.03	3.13
N-Pentane	nC5	2.22	2.42	2.53
Hexanes	C6	6.88	7.74	8.44
Heptanes Plus	C7+	37.22	42.34	48.90
TOTAL		100.00	100.00	100.00

Stream Properties

Molecular Weight	:	77.4	87.6	100.7
Density @ P & T	:	0.588	0.612	0.639

Hexanes Plus Properties

Mol %	:	44.10	50.08	57.34
Molecular Weight	:	135.5	141.5	149.0
Density (gm/cc @ 60 °F)	:	0.774	0.780	0.788
Gravity (°API @ 60 °F)	:	51.1	49.6	47.8

Heptanes Plus Properties

Molecular Weight	:	145.0	152.0	160.2
Density (gm/cc @ 60 °F)	:	0.785	0.792	0.799
Gravity (°API @ 60 °F)	:	48.6	47.1	45.4

PETROLAB

CALCULATED RETROGRADE LIQUID COMPOSITIONS

Pressure (psig):		800	350 *	350 **
Component		Mol %	Mol %	Mol %
Hydrogen Sulphide	H2S	0.00	0.00	0.00
Carbon Dioxide	CO2	2.38	1.23	1.04
Nitrogen	N2	0.51	0.11	0.04
Methane	C1	12.96	6.31	7.07
Ethane	C2	2.83	1.56	1.88
Propane	C3	3.46	2.10	2.24
Iso-Butane	iC4	2.65	1.75	1.76
N-Butane	nC4	2.68	1.84	2.07
Iso-Pentane	iC5	3.03	2.29	2.50
N-Pentane	nC5	2.50	1.95	1.90
Hexanes	C6	9.12	8.43	6.01
Heptanes Plus	C7+	57.88	72.43	73.49
TOTAL		100.00	100.00	100.00

Stream Properties

Molecular Weight	:	117.2	164.3	118.5
Density @ P & T	:	0.665	0.734	0.638

Hexanes Plus Properties

Mol %	:	67.00	80.86	79.50
Molecular Weight	:	156.0	193.1	138.3
Density (gm/cc @ 60 °F)	:	0.795	0.828	0.778
Gravity (°API @ 60 °F)	:	46.3	39.3	50.3

Heptanes Plus Properties

Molecular Weight	:	167.3	205.8	142.7
Density (gm/cc @ 60 °F)	:	0.805	0.836	0.783
Gravity (°API @ 60 °F)	:	44.0	37.6	49.1

* Abandonment Pressure Liquid Composition from Material Balance
** Abandonment Pressure Liquid Composition Analysed

PETROLAB

CALCULATED CUMULATIVE RECOVERY DURING DEPLETION

per MMSCF of Original Reservoir Fluid *

Reservoir Pressure	Initial In Place ation Pressure	3827	3500	3050	2600	2150	1700	1250	800	350
Gas Phase - MSCF	1000	0	56.2	149.2	269.5	408.9	536.6	662.9	787.5	906.9
Stock Tank Liquid - °API @ 60 °F		66.6	69.0	69.4	69.9	70.4	71.3	72.1	71.9	70.6
Cumulative Produced (Bbl)	0.00	0.00	3.46	9.11	16.17	23.83	29.62	34.55	40.03	47.99
Remaining in Vapor (Bbl)	64.44	64.44	58.10	51.52	42.63	31.97	20.24	12.41	8.74	5.75
In Retrograde Liquid (Bbl)	0.00	0.00	2.88	3.81	5.64	8.64	14.58	17.48	15.67	10.70
Primary Separator Gas - MSCF	867.61	0.00	48.78	129.60	234.51	357.02	471.66	586.63	698.63	800.54
Second Stage Gas - MSCF	32.29	0.00	1.81	4.78	8.53	12.65	15.83	18.61	21.69	25.96
Stock Tank Gas - MSCF	39.39	0.00	2.21	5.84	10.44	15.51	19.53	23.12	27.06	32.29
		Total " Plant Products " - (Gallons) in Well Stream :								
Ethane	1566	0	88	234	422	641	842	1042	1240	1427
Propane	979	0	55	146	263	399	524	647	770	889
Butanes	959	0	54	143	258	390	509	627	746	865
Pentanes Plus	2930	0	163	430	767	1136	1428	1687	1967	2337
		Total " Plant Products " - (Gallons) in Primary Separator Gas :								
Ethane	1336	0	75	200	361	551	729	909	1085	1242
Propane	705	0	40	105	191	292	388	486	582	665
Butanes	534	0	30	80	145	222	297	374	449	512
Pentanes Plus	401	0	23	60	109	166	222	280	336	383
		Total " Plant Products " - (Gallons) in Secondary Separator Gas :								
Ethane	65	0	4	10	17	26	32	38	44	53
Propane	32	0	2	5	8	12	16	19	22	26
Butanes	20	0	1	3	5	8	10	12	14	16
Pentanes Plus	10	0	1	2	3	4	5	6	7	9
		Total " Plant Products " - (Gallons) in Stock Tank Gas :								
Ethane	150	0	8	22	40	59	74	87	101	121
Propane	193	0	11	29	51	76	96	114	133	159
Butanes	224	0	13	33	60	89	113	135	159	189
Pentanes Plus	159	0	9	24	42	63	81	97	115	136
		Gas Liquid Ratios *								
1st Sep. Gas/Stock Tank Liquid (SCF/BBL)		13464	14087	14315	14847	16002	19792	23336	20418	12801
1st+2nd Sep. Gas/Stock Tank Liquid (SCF/BBL)		13965	14610	14841	15379	16539	20343	23899	20979	13338
1st+2nd Sep+STTGas/Stock Tank Liquid (SCF/BBL)		14576	15247	15484	16030	17202	21037	24626	21698	13994
1st Sep. Gas/Produced WellStream (MSCF/MMSCF)		868	868	869	872	879	898	910	899	853
1st+2nd Sep. Gas/Produced WS (MSCF/MMSCF)		900	900	901	903	909	923	932	924	889
1st+2nd Sep.+STT Gas/Produced WS (MSCF/MMSCF)		939	939	940	942	945	954	960	955	933
Stock Tank Liquid/Produced WS (STB/MMSCF)		64	62	61	59	55	45	39	44	67

* Primary Separator @ 1500 psig and 100 °F; Secondary separator @ 500 psig and 80 °F; Stock Tank @ 14.696 psia and 60 °F

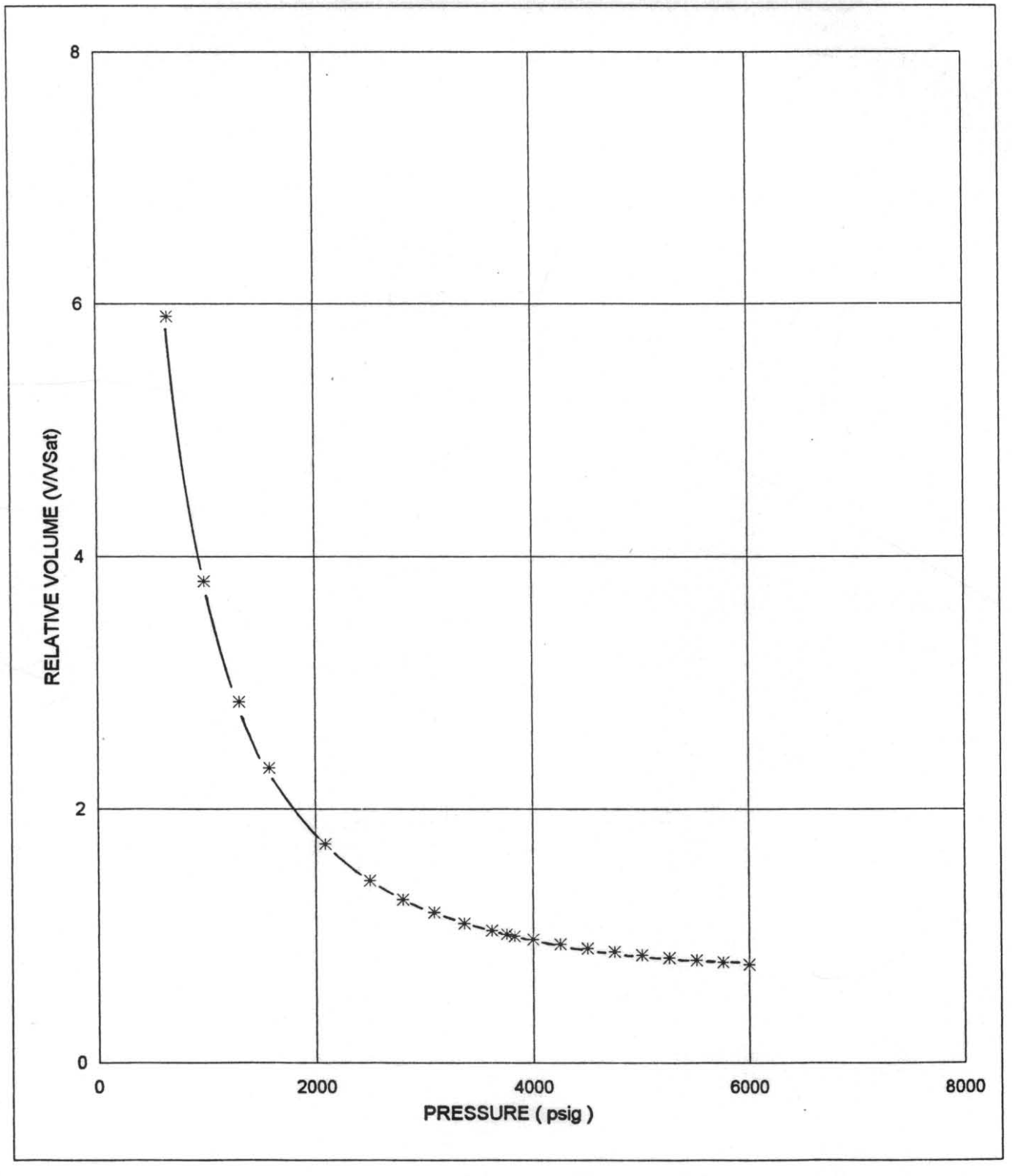
PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

RELATIVE VOLUME

Equation of best fit

V/VSat = +1.06E+01 -9.86E-03 * P +3.83E-06 * P^2 -6.54E-10 * P^3 +4.07E-14 * P^4



5 cm

570396

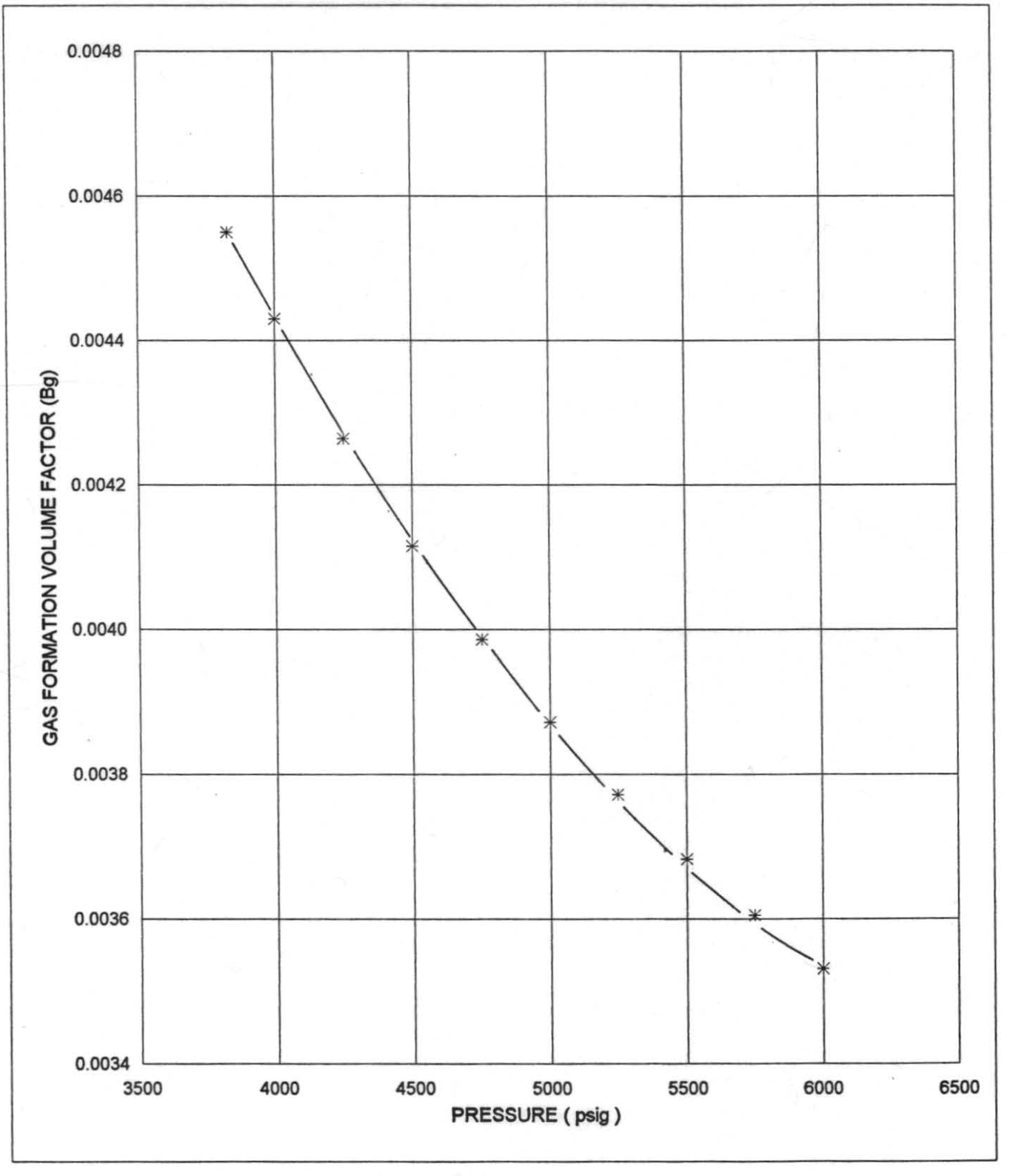
PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

GAS FORMATION VOLUME FACTOR

Equation of best fit

Bg = +5.55E-03 +1.63E-06 * P -1.01E-09 * P^2 +1.70E-13 * P^3 -9.53E-18 * P^4



5 cm

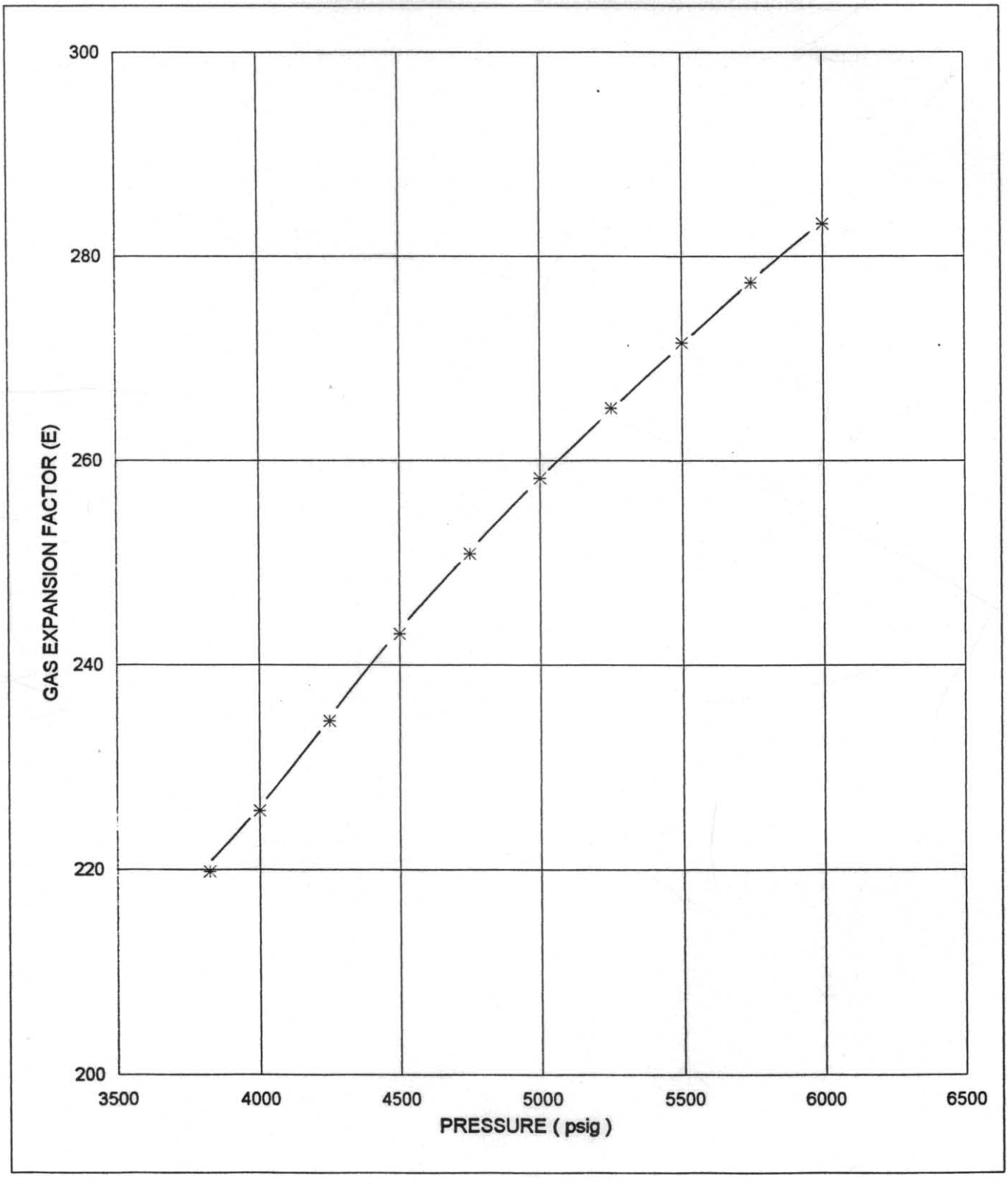
PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

GAS EXPANSION FACTOR

Equation of best fit

E = +4.74E+02 -3.09E-01 * P +1.12E-04 * P^2 -1.57E-08 * P^3 +7.91E-13 * P^4



5 cm

PETROLAB

Company : Premier Oil Australia Pty. Ltd. | Page : 21 of 31
Well : White Ibis #1 | File : P 98045

GAS DEVIATION FACTOR

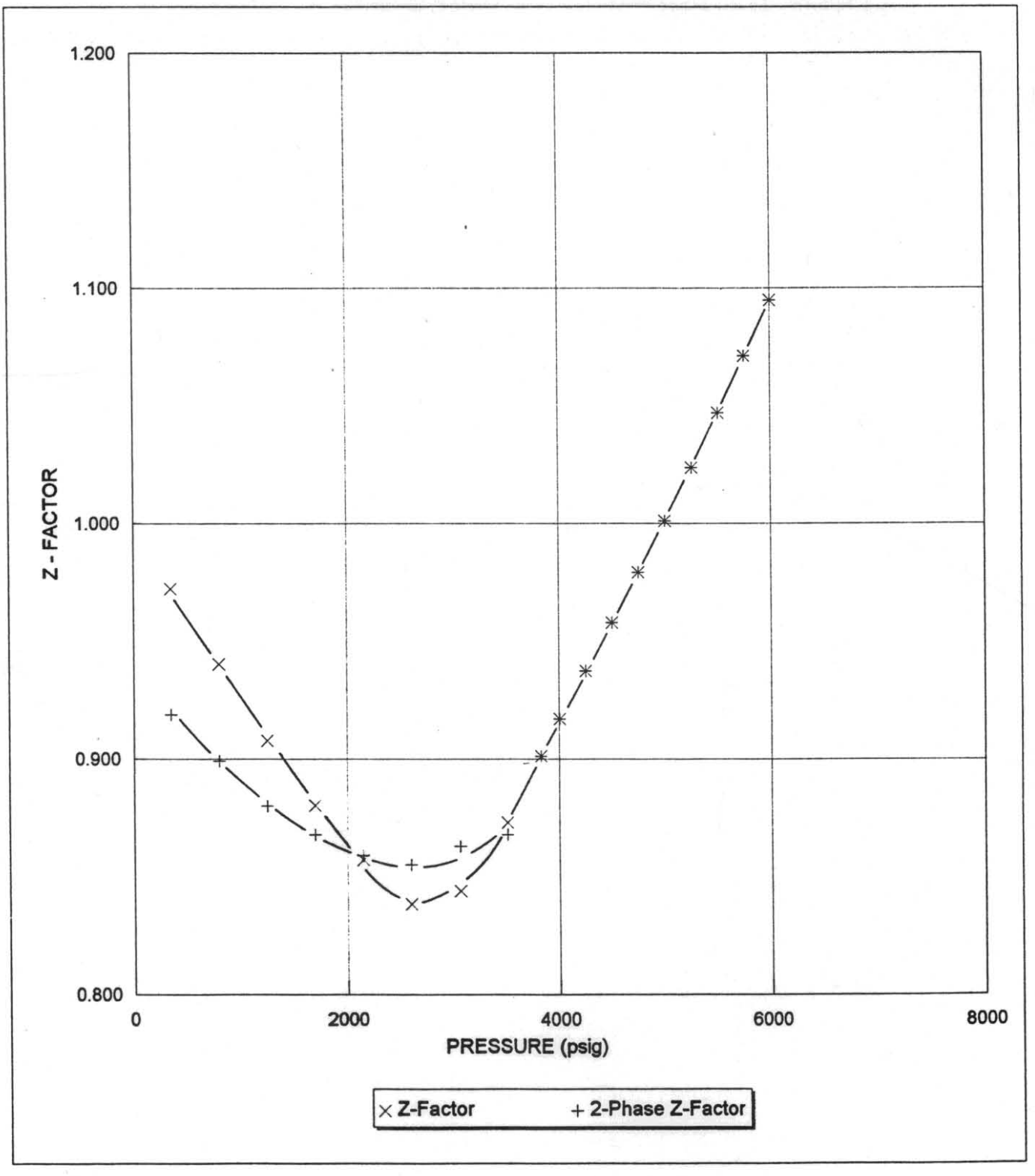
Equation of best fit

Z

$Z = +1.00E+00 +-6.44E-05 * P +-2.58E-08 * P^2 +1.42E-11 * P^3 +-1.28E-15 * P^4$

2 phase Z

$2phZ = +9.97E-01 +-2.85E-04 * P +2.83E-07 * P^2 +-1.40E-10 * P^3 +3.20E-14 * P^4$



5 cm

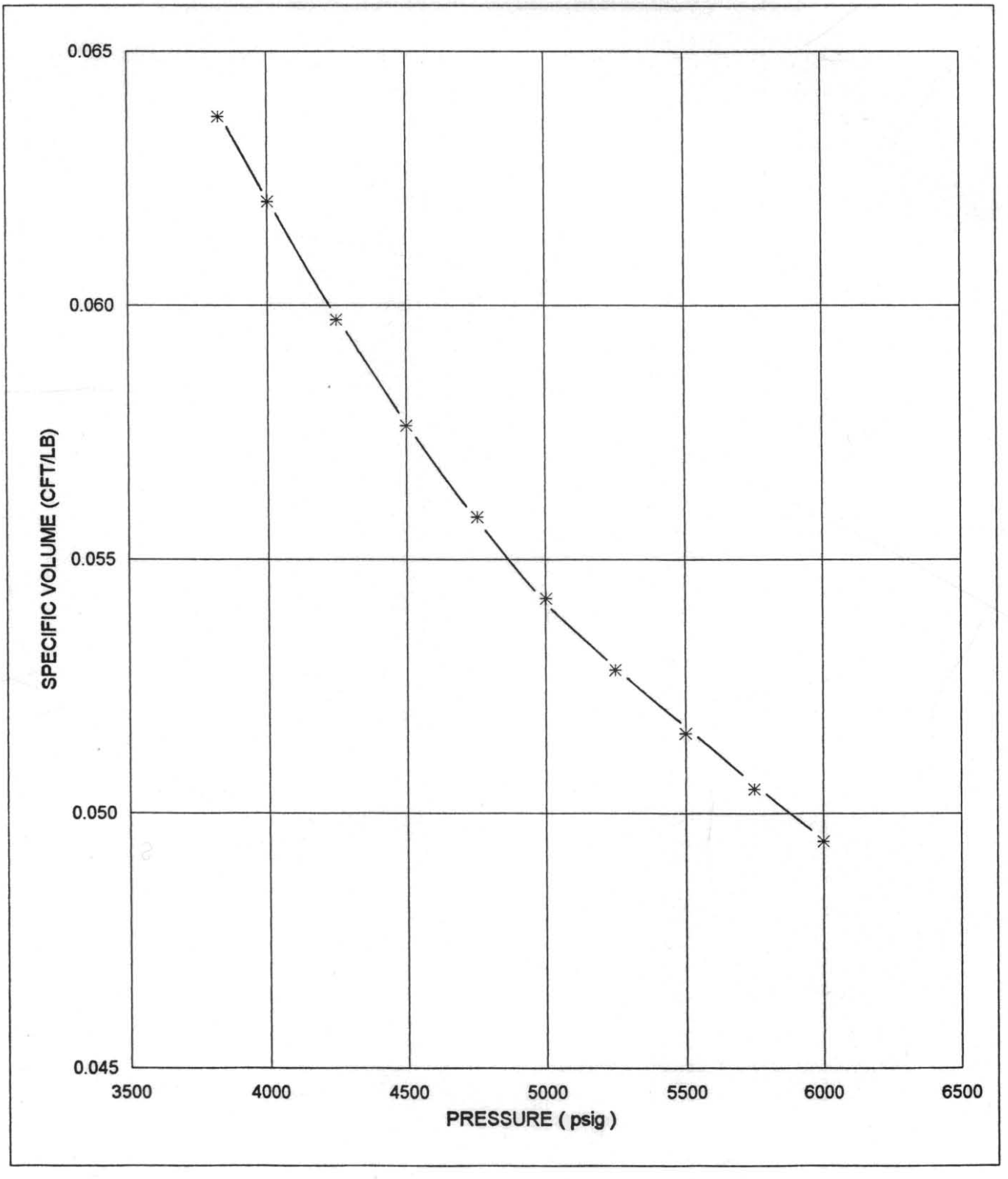
PETROLAB

Company : Premier Oil Australia Pty. Ltd. | Page : 22 of 31
Well : White Ibis #1 | File : P 98045

RESERVOIR FLUID SPECIFIC VOLUME

Equation of best fit

SV = +7.77E-02 +2.29E-05 * P -1.41E-08 * P^2 +2.38E-12 * P^3 -1.33E-16 * P^4



5 cm

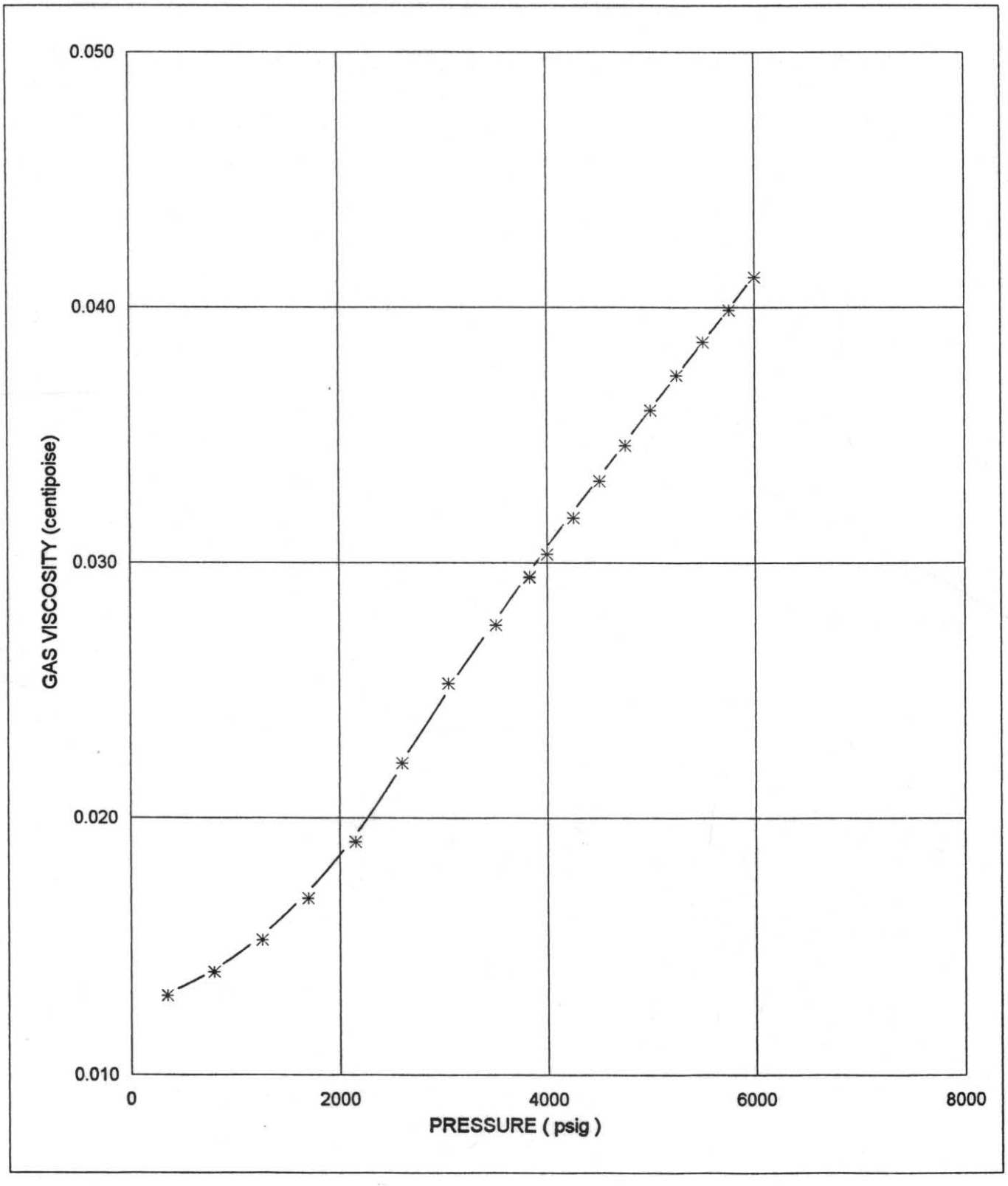
PETROLAB

Company : Premier Oil Australia Pty. Ltd.
Well : White Ibis #1

VISCOSITY OF RESERVOIR FLUID

Equation of best fit

μ = +1.36E-02 -2.10E-06 * P +3.32E-09 * P^2 -5.73E-13 * P^3 +3.42E-17 * P^4



5 cm

570401

PETROLAB

Company : Premier Oil Australia Pty. Ltd. | Page : 24 of 31
Well : White Ibis #1 | File : P 98045

RETROGRADE CONDENSATION

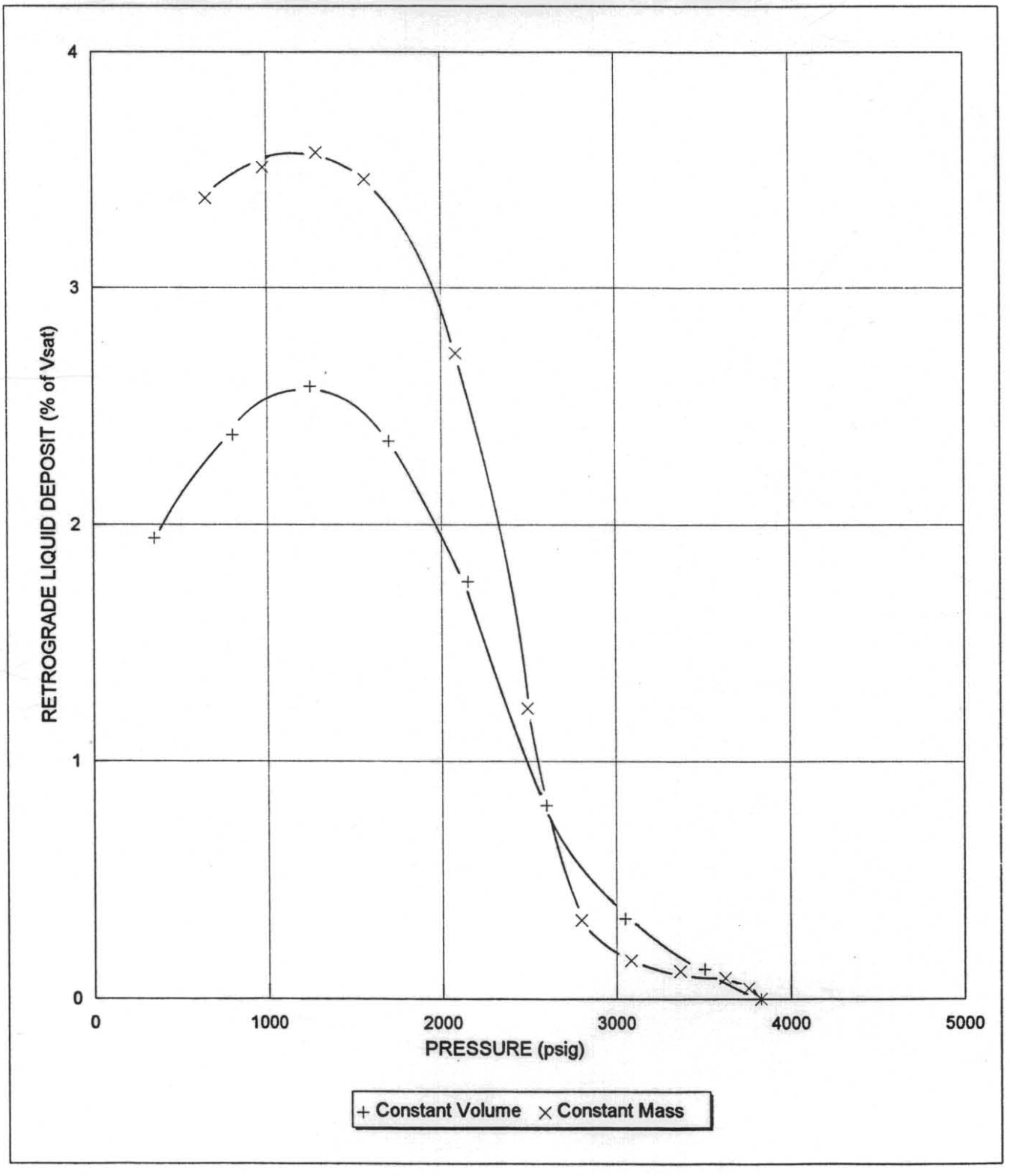
Equation of best fit

Constant Volume

RLD = +1.16E+00 +2.59E-03 * P -1.18E-06 * P^2 -4.93E-11 * P^3 +4.19E-14 * P^4

Constant Mass

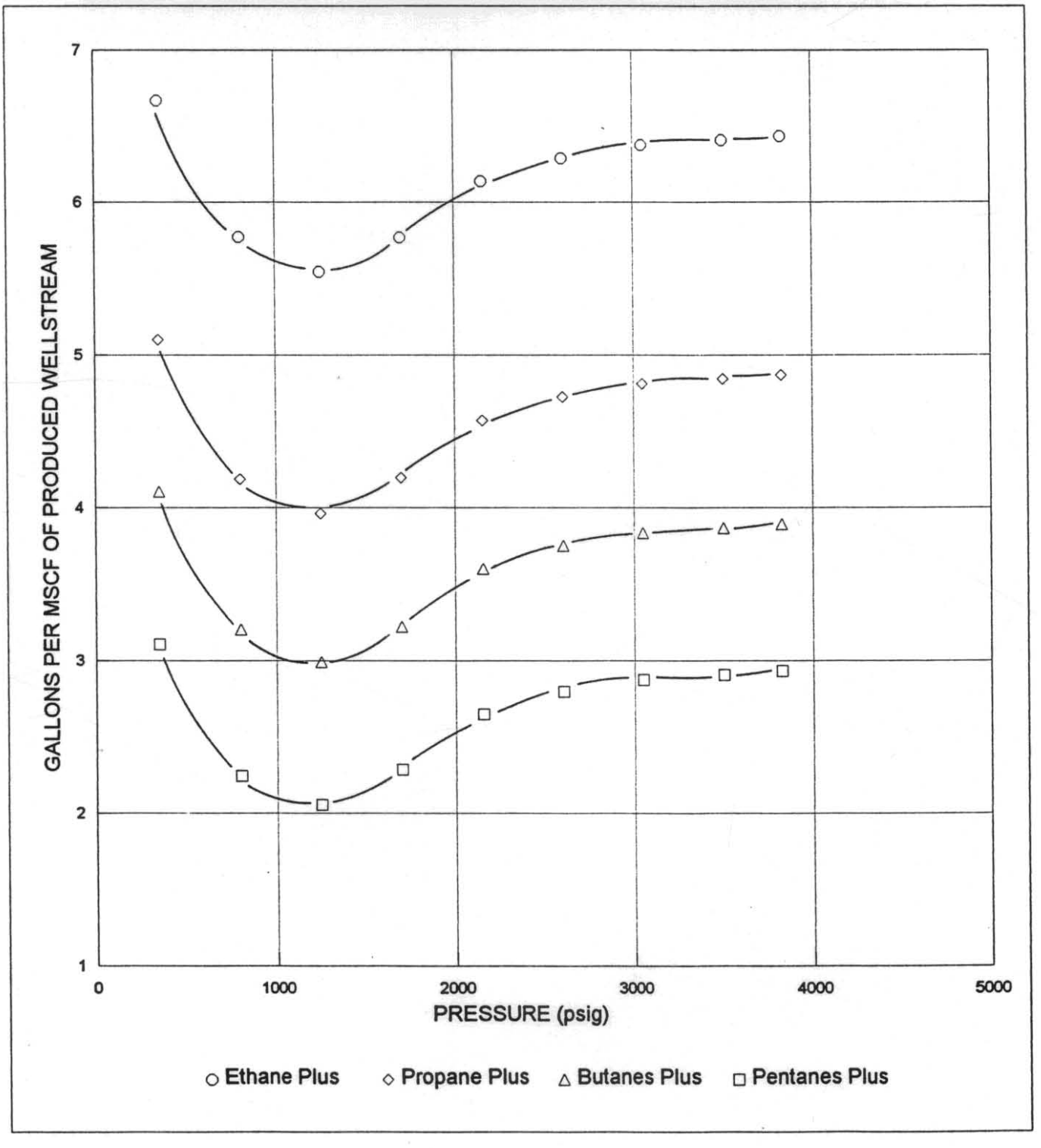
RLD = +8.58E-01 +5.59E-03 * P -3.07E-06 * P^2 +2.86E-10 * P^3 +3.21E-14 * P^4



5 cm

GPM CONTENT IN PRODUCED WELLSTREAM

Ethane Plus GPM Content = +8.26E+00 -5.90E-03 * P +4.32E-06 * P^2 -1.20E-09 * P^3 +1.15E-13 * P^4
Propane Plus GPM Content = +6.73E+00 -6.03E-03 * P +4.44E-06 * P^2 -1.24E-09 * P^3 +1.19E-13 * P^4
Butanes Plus GPM Content = +5.71E+00 -5.99E-03 * P +4.42E-06 * P^2 -1.24E-09 * P^3 +1.19E-13 * P^4
Pentanes Plus GPM Content = +4.65E+00 -5.75E-03 * P +4.27E-06 * P^2 -1.20E-09 * P^3 +1.17E-13 * P^4



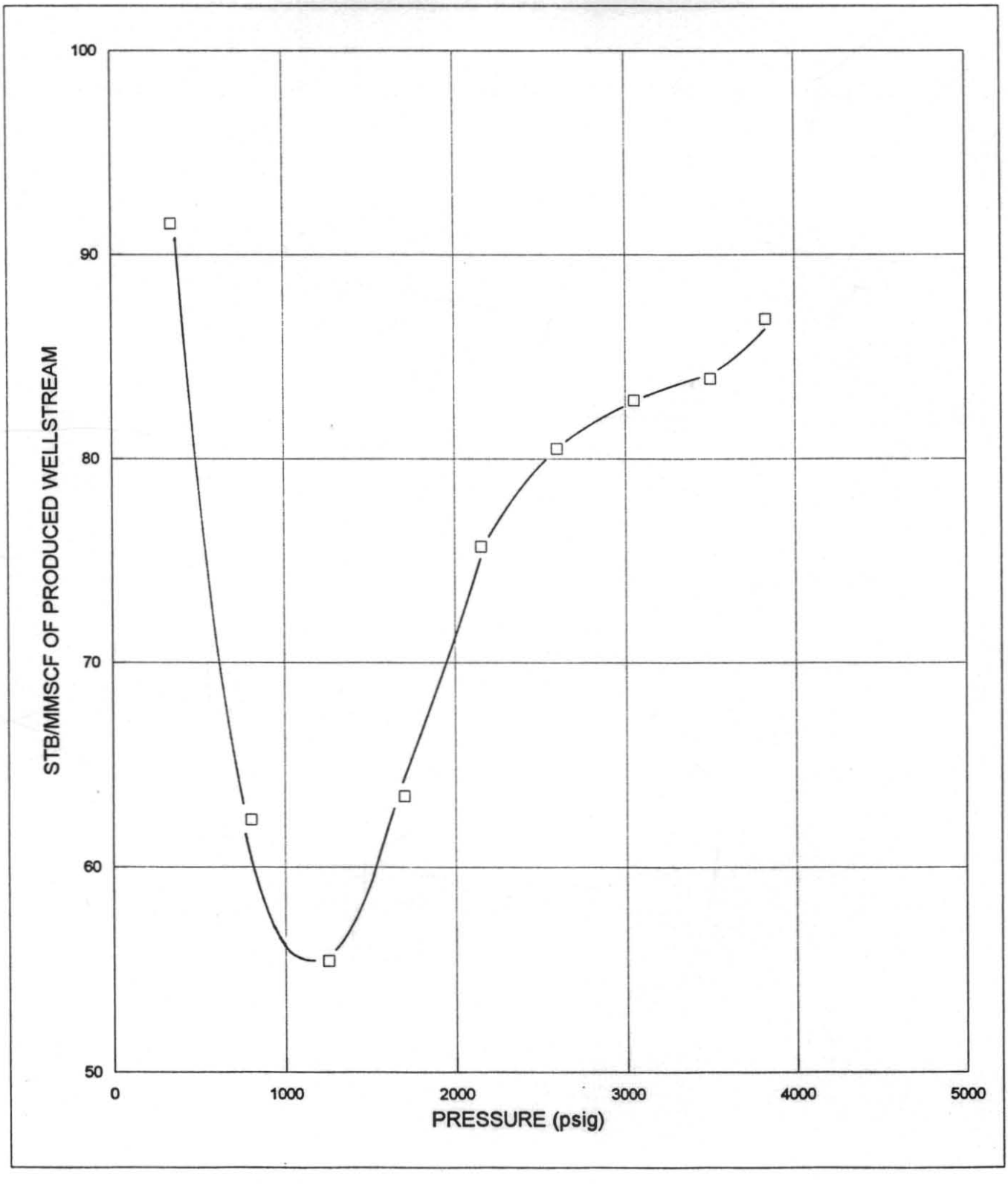
5 cm

PETROLAB

Company: Premier Oil Australia Pty. Ltd.
Well : White Ibis # 1

STOCK TANK LIQUID
IN PRODUCED WELLSTREAM

STL = +1.45E+02 -2.00E-01 * P +1.51E-04 * P^2 -4.30E-08 * P^3 +4.26E-12 * P^4



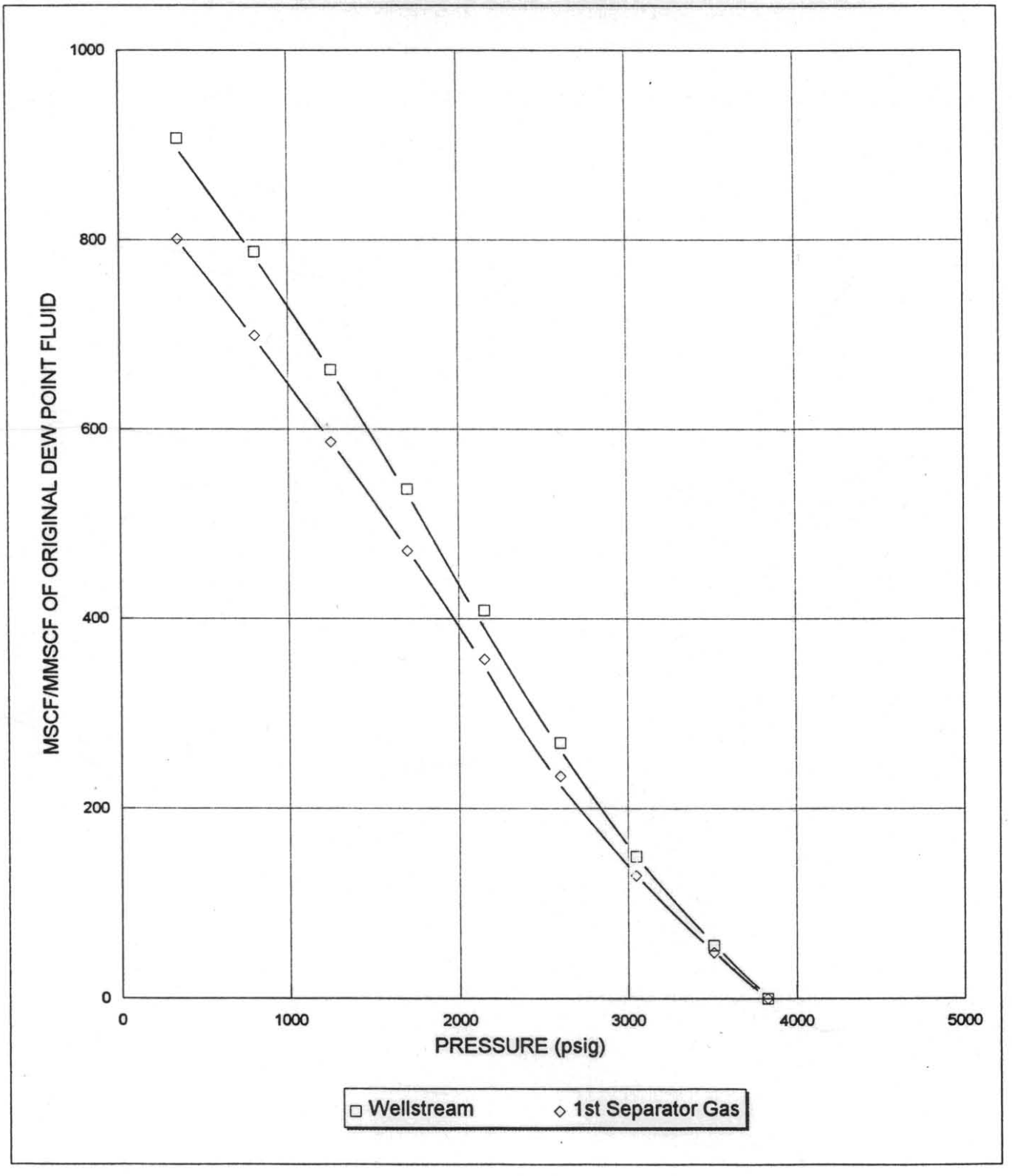
5 cm

PETROLAB

Company: Premier Oil Australia Pty. Ltd.
Well : White Ibis # 1

CUMULATIVE VOLUMES PRODUCED

Cum Vol W/S = +1.00E+03 -2.76E-01 * P +2.38E-05 * P^2 -1.93E-08 * P^3 +3.70E-12 * P^4
Cum Vol Sep Gas = +8.75E+02 -2.08E-01 * P -1.40E-05 * P^2 -5.34E-09 * P^3 +1.98E-12 * P^4

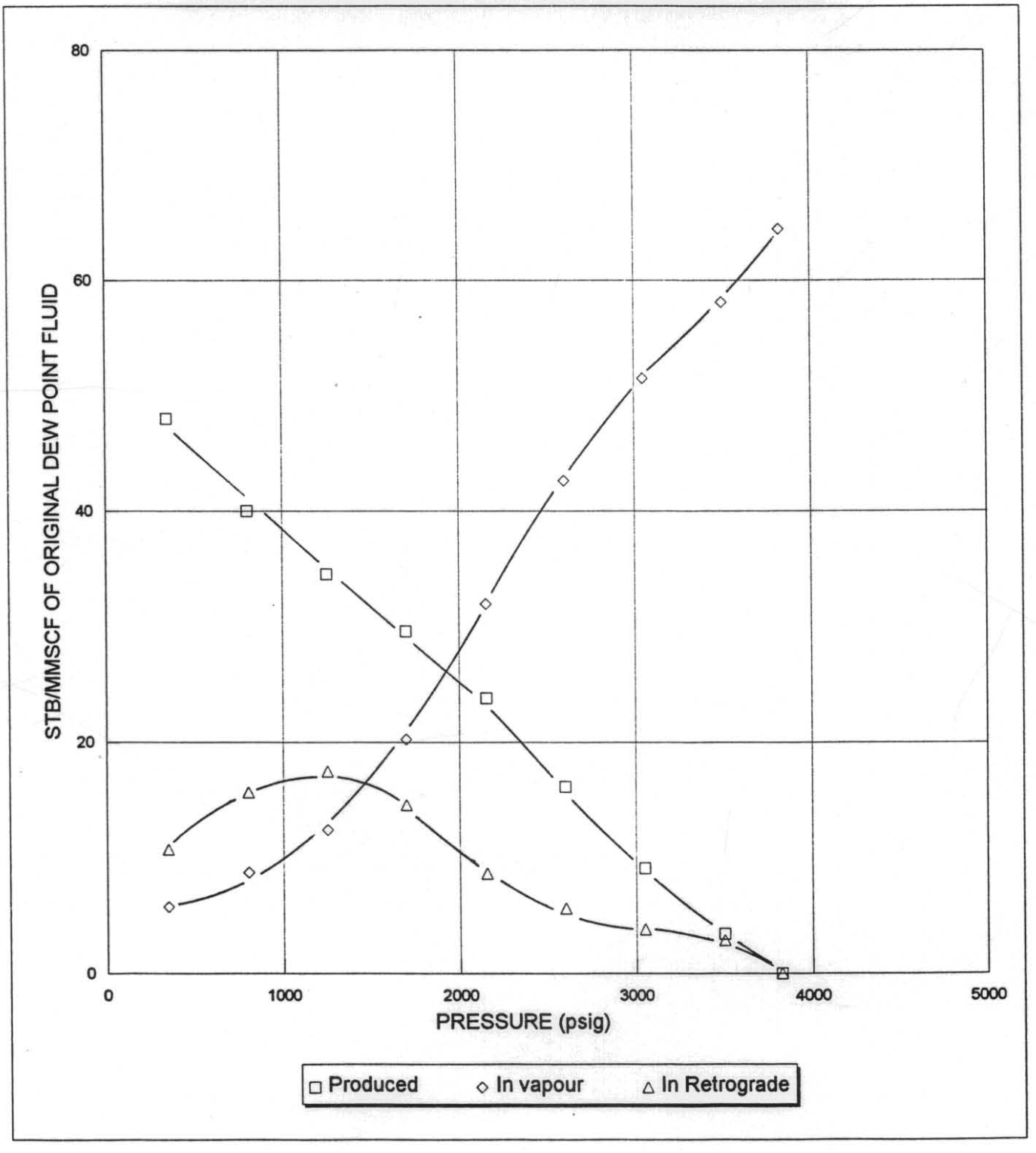


5 cm

PETROLAB

CUMULATIVE STOCK TANK LIQUID PRODUCTION AND CONDENSATION

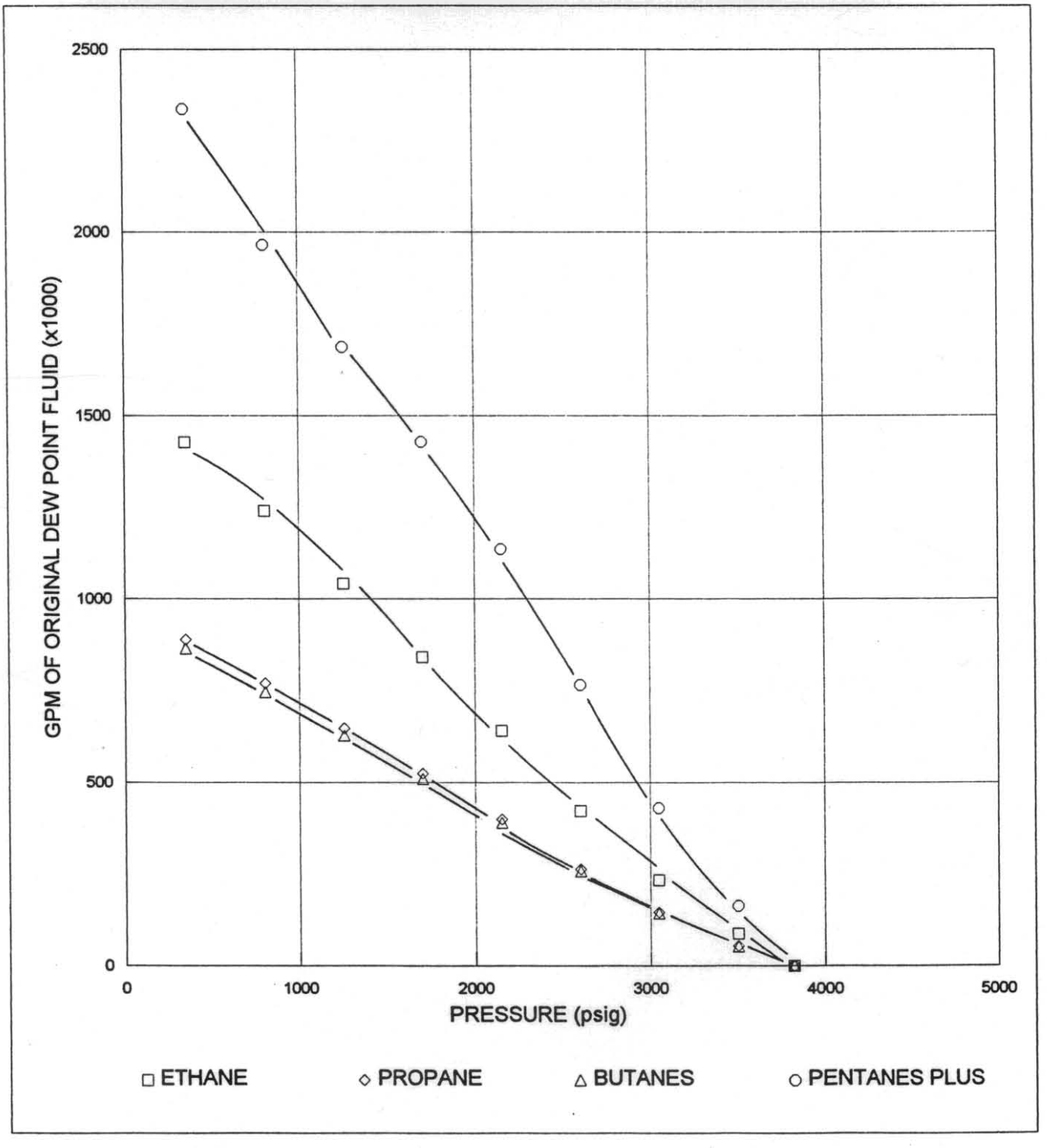
Produced = +5.72E+01 -3.23E-02 * P +1.87E-05 * P^2 -6.90E-09 * P^3 +8.37E-13 * P^4
In Vapour = -2.99E+00 +4.20E-02 * P -6.30E-05 * P^2 +4.54E-08 * P^3 -1.28E-11 * P^4
In Retrograde = -6.74E-02 +3.89E-02 * P -2.74E-05 * P^2 +6.23E-09 * P^3 -4.30E-13 * P^4



5 cm

PLANT PRODUCTS IN PRODUCED WELLSTREAM
PRODUCED DURING CONSTANT VOLUME DEPLETION

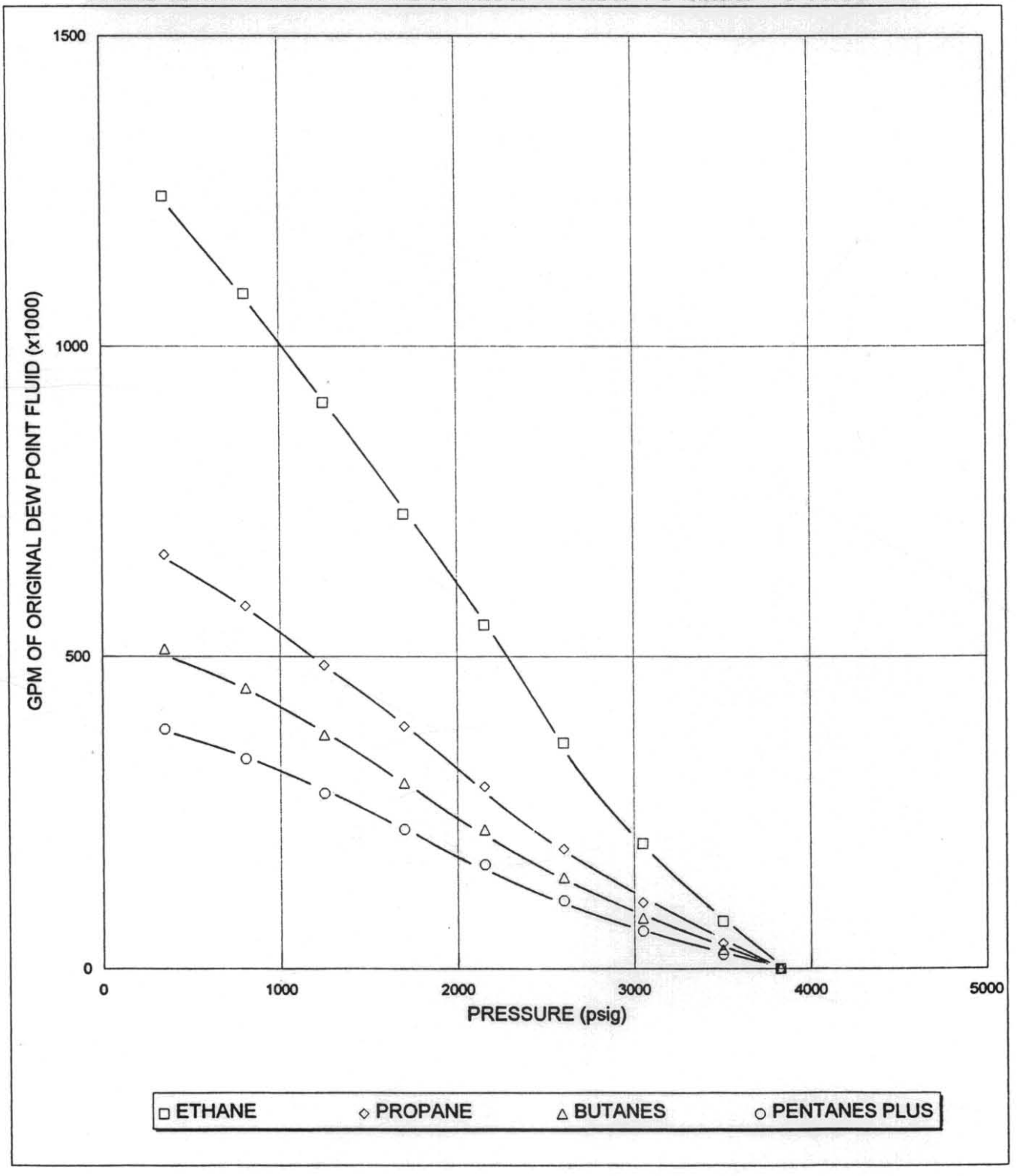
Ethane Plus GPM Content = +1.57E+03 -4.24E-01 * P +2.49E-05 * P^2 -2.57E-08 * P^3 +5.26E-12 * P^4
Propane Plus GPM Content = +9.85E+02 -2.84E-01 * P +3.23E-05 * P^2 -2.12E-08 * P^3 +3.82E-12 * P^4
Butanes Plus GPM Content = +9.66E+02 -3.05E-01 * P +5.63E-05 * P^2 -2.85E-08 * P^3 +4.53E-12 * P^4
Pentanes Plus GPM Content = +2.74E+03 -1.38E+00 * P +7.21E-04 * P^2 -2.72E-07 * P^3 +3.37E-11 * P^4



5 cm

PLANT PRODUCTS
IN PRIMARY SEPARATOR GAS

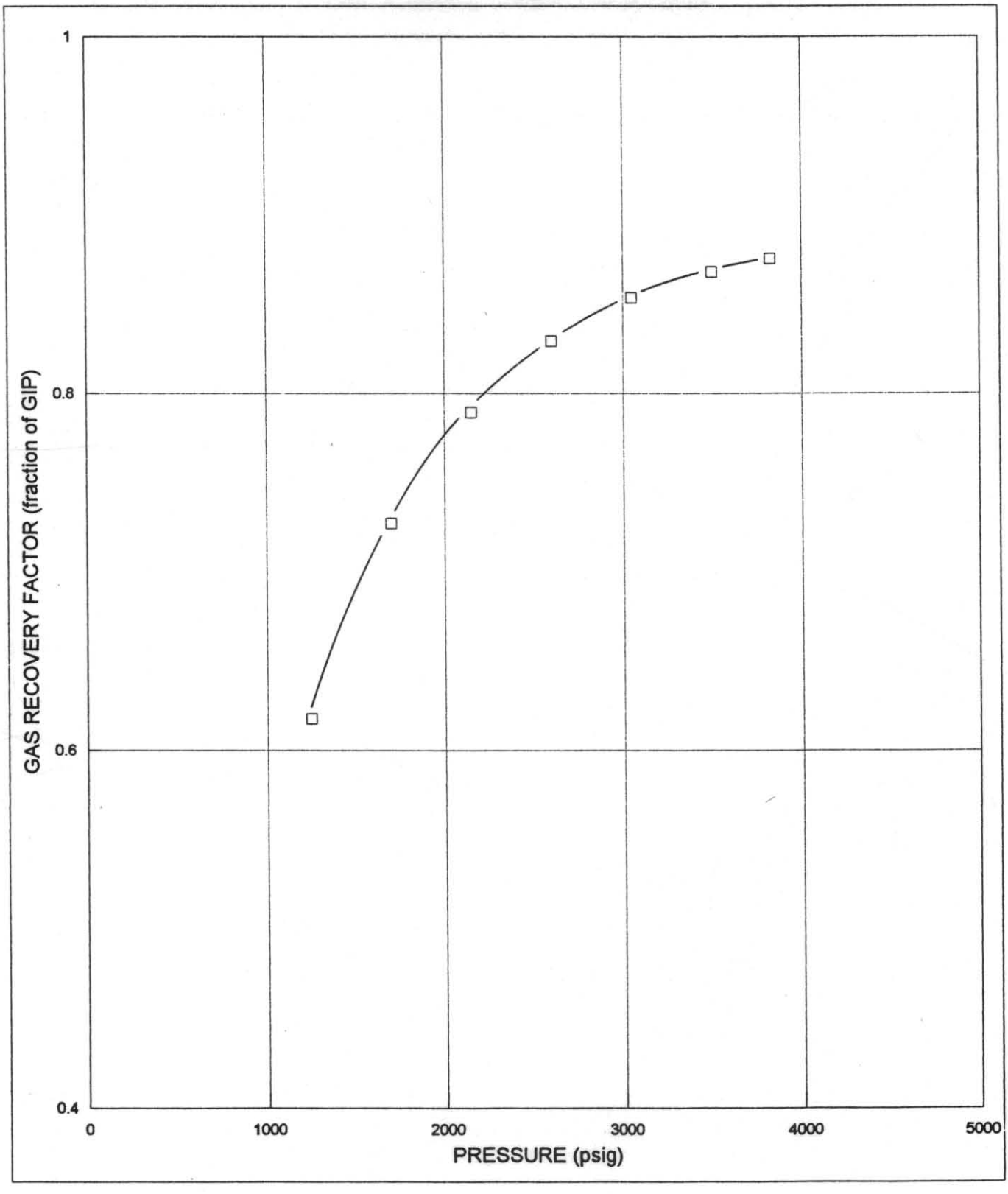
Ethane Plus GPM Content = +1.35E+03 -3.08E-01 * P -3.76E-05 * P^2 -2.56E-09 * P^3 +2.43E-12 * P^4
Propane Plus GPM Content = +7.21E+02 -1.48E-01 * P -3.78E-05 * P^2 +4.90E-09 * P^3 +5.90E-13 * P^4
Butanes Plus GPM Content = +5.52E+02 -1.00E-01 * P -4.43E-05 * P^2 +9.21E-09 * P^3 -1.60E-13 * P^4
Pentanes Plus GPM Content = +4.14E+02 -7.85E-02 * P -3.00E-05 * P^2 +5.85E-09 * P^3 -5.27E-15 * P^4



5 cm

GAS RECOVERY FACTOR

Gas Recovery Factor = -5.27E-01 +1.70E-03 * P -8.46E-07 * P^2 +1.96E-10 * P^3 -1.73E-14 * P^4



5 cm

Premier Oil
Australasia

WIRELINE LOGGING – MDT (PRESSURE) REPORT

WELL NO: White Ibis-1

DATE: 16-17/5/1998

CONTRACTOR: Schluberger
ENGINEER: Y. Frans
WITNESS: Fontaine/Frankiwitz

WELL NO: White Ibis LOG NO: One

DEEPEST SURVEY DATA

DEPTH: MD: TVD: ANGLE: DEG:

LOG TYPE: MDT
REFERENCE LOG: PEX/AS
REFERENCE LOG NO: One

TEST NO.	DEPTH		HYDROSTATIC PRESSURE		SET TOOL	FORMATION PRESSURE		RETRACT TOOL	HYDROSTATIC PRESSURE		DRAW DOWN	MOBILITY mD	TEMP ^{0}C
			BEFORE TEST						AFTER TEST				
	MEASURED	TRUE VERTICAL	STRAIN	HP		STRAIN	HP		STRAIN	HP			
			PSIG	PSIA	TIME	PSIG	PSIA	TIME	PSIG	PSIA	PSI		
1	1976.0		3354.4	3367.5		-	-		3354.9	3367.39	14	Tight	101.9
2	1975.5		3353.1	3366.63		2842.7	2854.87		3353.7	3366.22	853	3.1	102.3
3	1979.8		3361.5	3373.54		-	-		3361.4	3372.51	20	Tight	102.9
4	1980.7		3362.6	3374.37		-	-		3362.5	3373.6	32	Tight	103.4
5	1980.3		3361.9	3373.48		2846.4	2857.56		3361.4	3372.73	2851.0	946.7	103.6
6	1981.5		3363.8	3375.12		-	-		3363.8	3374.62	34	Tight	103.9
7	1984.5		3368.2	3379.71		28532.0	2863.68		3368.2	3378.97	2820.5	121.8	105.1
8	2002.0		3396.7	3407.71		2897.0	2907.72		3396.5	3407.37	2757.2	36	105.1
10	2004.5		3400.6	3411.35		2897.7	2908.39		3400.5	3411.1	2739.6	36.9	105.2
11	2006.4		3403.6	3414.55		2897.3	2908.08		3403.6	3413.9	2805.1	60.1	105.3
12	2008.5		3406.7	3417.48		2897.4	2908.2		3406.5	3417.43	2544.1	15.2	105.4
13	2010.4		3409.6	3420.32		2898.4	2909.17		3409.4	3420.08	2791.1	50.9	105.5
14	2013.8		3415.1	3426.03		2900.8	2911.76		3414.7	3425.7	2714.2	30.4	105.6
15	2015.2		3416.8	3427.80		2900.7	2911.63		3416.7	3427.83	2839.0	77.2	106.0
16	2018.0		3421.5	3432.48		2903.4	2914.49		3421.4	3431.83	2562.3	18.2	106.5
17	2019.5		3423.7	3434.80		2903.4	2914.52		3423.4	3434.5	2841.8	71.8	106.6
18	2005.8		3401.3	3412.14		2896.6	2907.33		3400.6	3411.95	2861.4	140.3	106.1

5704709

19	2021.3		3426.0	3437.27		2904.8	2916.16		34.	3437.25	2888.7	253.0	1
20	2023.5		3429.2	344.83		2905.5	2917.08		3429.3	344.76	2724.0	34.9	106.4
21	2028.2		3436.7	3448.46		2912.1	2923.77		3436.6	3448.16	2819.1	63.1	106.8
22	2035.5		3448.4	3460.38		2923.1	2934.85		3448.2	3460.14	2781.8	41.7	108.1
23	2044.5		3462.8	3474.77		2942.5	2954.25		3463.1	3474.68	28-7.5	45.3	107.8
24	2046.0		3465.4	3477.33		2943.9	2955.63		3465.1	3476.85	2689.1	25.2	108.1
25	2048.0		3468.5	3480.25		2943.5	2955.18		3468.2	3480.07	2936.61	339.8	108.4
26	2050.1		3471.6	3483.92		2943.7	2955.38		3471.1	3483.35	2849.0	48.0	108.4
27	2052.2		3475.1	3486.82		2944.9	2956.68		3479.8	3486.55	2877.7	87.9	108.5
28	2057.0		3482.5	3494.43		2951.7	2963.51		3482.3	3494.12	2677.4	23.0	108.7
29	2059.0		3485.6	3497.70		2954.8	2966.52		3485.4	3497.29	2087.7	5.3	109.1
30	2068.5		3501.0	3513.00		2967.1	2978.89		3501.0	3512.65	2810.5	38.9	109.2
31	2074.0		3509.5	3521.58		2974.6	2986.38		3509.8	3521.73	2449.6	11.5	109.5
32	2078.5		3517.0	3528.87		2980.8	2992.69		3517.1	3529.0	2941.8	134.9	109.7
33	2079.4		3518.3	3530.51		2981.7	2993.64		3518.3	3530.34	2971.1	266.2	109.8
34	2090.0		3535.8	3547.91		2998.4	3008.42		3535.9	3546.9	2709.3	28.0	110.1
35	2099.2		3563.19	3551.2		3014.7	3026.60		3551.4	3563.44	1783.8	1.1	110.4
36	2106.0		3561.8	3523.69		3023.0	3035.02		3562.0	3574.15		9.7	110.8
37	2111.0		3570.8	3583.07		3029.5	3041.4		3571.0	3583.07	1921.1	3.8	111.2
38	2118.6		3583.0	3595.0		-	-		3583.3	3597.31	1514.9	Tight	111.1
39	2129.2		3601.3	3613.12		3069.2	3081.23		3600.7	3612.71	1749.5	2.0	111.3
40	2132.7		3607.0	3618.98		3065.8	3077.79		3606.6	3618.65	2829.7	34.4	111.5
41	2133.6		3609.2	3620.44		3071.4	3083.49		3608.6	3620.65	1416.9	1.4	111.7
42	2136.4		3613.4	3625.58		3066.5	3078.59		3613.6	3625.54	2653.4	13.9	111.8
43	2137.3		3614.8	3626.88		3066.2	3078.35		3614.2	3626.18	2458.1	10.0	111.9
44	2138.5		3616.5	3629.49		3066.5	3078.59		3616.7	3628.75	2610.4	12.9	112.0
45	2141.1		3621.2	3633.34		3069.2	3081.33		3621.1	3633.44	1577.85	2.8	111.9
46	2146.3		3630.1	3642.42		3075.6	3087.80		3629.5	3642.3	2784.94	21.3	112.4
47	2153.5		3642.1	3653.62		3082.7	3094.89		3641.3	3654.6	3030.18	76.5	112.3
48	2129.6		3602.3	3614.69		-	-		3601.9	3614.0		Tight	

570410

49	1901.0		3219.1	3232.09		2791.9	2754.97		3218.4	3231.73	2704.6	124.7	103.6
50	1919.0		3248.7	3261.97		2762.2	2775.09		3248.8	3261.71	2762.2	558.7	104.1
51	1954.0		3306.5	3320.06		2809.2	2822.14		3306.3	3319.79	2798.0	229.4	104.9
MDT													
	2006.0		3400.3	3410.80		2895.8	2907.40						
	2006.0		3397.7	NA		2895.5	2907.15						
	2015.2		3411.0	NA		2899.1	NA		3411.07	NA			
	2048.5												

570411

APPENDIX 13

PETROLOGICAL/MINERALOGICAL REPORT

WHITE IBIS 1

570413

PETROLOGY AND RESERVOIR QUALITY OF SIDEWALL CORE SAMPLES FROM WHITE IBIS-1

by

Julian C. Baker PhD
Ken R. Martin MSc PhD

A report to:

Premier Oil Australia Pty Ltd.
45 Ord St.
West Perth, WA, 6005

18 February, 1999

K.R. MARTIN PTY LTD ACN 010 141 107 PO BOX 22 KENMORE QUEENSLAND AUSTRALIA 4069

570414

CONTENTS

Page

1. INTRODUCTION 1

2. ANALYTICAL PROGRAMME 1

2.1 THIN-SECTION ANALYSIS 1

2.2 X-RAY DIFFRACTION ANALYSIS 1

3. PETROGRAPHY 2

3.1 TEXTURE 2

3.2 COMPOSITION 2

TABLE 1. THIN-SECTION ANALYSIS 3

TABLE 2. QFR COMPOSITIONS 4

FIGURE 1. QFR COMPOSITIONS 4

4. X-RAY DIFFRACTION ANALYSIS 6

TABLE 3. QUANTITATIVE XRD ANALYSIS 7

TABLE 4. QUALITATIVE XRD ANALYSIS 8

FIGURE 2. QTZ (XRD)/QTZ (THIN-SECTION) CROSS-PLOT 9

FIGURE 3. CLAY+MICA (XRD)/ CLAY+MICA (TS) CROSS-PLOT 9

FIGURE 4. SIDERITE (XRD)/SIDERITE (TS) CROSS-PLOT 9

5. SANDSTONE DIAGENESIS 10

6. RESERVOIR QUALITY 12

7. CONCLUSIONS 13

REFERENCES 14

APPENDIX 1. X-RAY DIFFRACTOGRAMS (FINE-FRACTION)

APPENDIX 2. PHOTOMICROGRAPHS

1. INTRODUCTION

Twenty badly impact-damaged sidewall core samples from White Ibis-1 were received for petrological analysis. All samples are sandstones except the lowest two samples, which are altered volcanics. Sample depths are given in Table 1.

2. ANALYTICAL PROGRAMME

2.1 THIN-SECTION ANALYSIS

Samples were impregnated with blue dyed epoxy resin to assist in porosity recognition, and thin-sections were prepared by cutting and grinding in kerosene to minimise any potential for damage due to freshwater sensitivity. Selected thin-sections were stained with Alizarin red-S and potassium ferricyanide to aid carbonate identification. Mineral composition and visible porosity were determined by a count of 200 points in each thin-section. In most sandstones, visible porosity could not be accurately measured because sandstone texture has been severely disrupted by sidewall coring. Mean grain size of the sandstones was estimated in thin-section with the aid of an eyepiece graticule. Photomicrographs were taken to illustrate features described from thin-section, particularly texture, mineralogy and the effects of diagenesis on porosity.

2.2 X-RAY DIFFRACTION ANALYSIS

Quantitative XRD analysis was carried out on all samples in order to quantify mineral abundance. The analysis used a finely ground whole rock powder sample and the SIROQUANT processing technique was used to calculate mineral abundance. In addition, qualitative XRD analysis was carried out on the fine fraction of ten samples, including the two volcanics, in order to precisely determine clay mineralogy. The fine fraction was separated from each sample by disaggregation and settling in distilled water and was air dried on glass discs to produce oriented specimens for XRD analysis. Samples were analysed in air dried condition and also following treatment with ethylene glycol.

3. PETROGRAPHY

3.1 TEXTURE

Sandstones: Textural data are given in Table 1. Most samples have undergone almost complete textural reorganisation as a result of sidewall coring, and were particularly susceptible to impact damage on account of their high quartz content and generally coarse grain size. Mean grain size is highly variable, ranging from 0.08mm (very fine sand) to 1.70mm (very coarse sand). All except four sandstones are medium to very coarse grained. Sorting decreases with increasing grain size, with very fine to fine grained sandstones being well sorted, medium grained sandstones being moderately well sorted, and coarse to very coarse grained sandstones being poorly to moderately well sorted. Dispersed sideritic detrital clay matrix is common in #27, sporadic, sideritic argillaceous laminae are included in #12 and #28, and small, scattered, sideritic argillaceous patches occur in #6, #18, #21 and #22. Otherwise, the sandstones are massive. Excluding overgrowths and broken grains, most quartz grains are subangular to subrounded.

Volcanics (#1, #2): SWC #1 consists of patchy secondary clay and intergrown, 0.10-0.25mm, anhedral crystals of feldspar which form a groundmass within which there are altered phenocrysts up to 3.0mm in length. The phenocrysts are largely replaced by coarsely-crystalline carbonate, and the argillaceous/feldspathic groundmass is cut by several carbonate veins. SWC #2 consists of fine grained groundmass which contains the silicified remnants of randomly-oriented plagioclase laths up to 0.33mm in length. This groundmass has largely altered to clay and been replaced by coarsely-crystalline carbonate.

3.2 COMPOSITION

Sandstones: Compositional data for all samples are given in Table 1 and QFR ratios are given in Table 2 and plotted in Figure 1. Samples are quartzarenites with a mean QFR ratio of 99:0:1. Quartz content ranges from 35.5% to 79.5%, averages 63.8% and exceeds 60% in the majority of samples. Lower quartz contents reflect the presence of abundant siderite. Most quartz is monocrystalline, although in the coarsest sandstones, up to 15% quartz is polycrystalline. Yellow-brown tourmaline is included in some quartz grains. Rock fragments range up to 3.0% and consist almost entirely of low-grade metasediments (quartz-muscovite

TABLE 1. THIN-SECTION ANALYSIS

SWC #	Depth (m)	COMPOSITION														TEXTURE	
		Qtz	Cht	Feld	IRF	MRF	SRF	Mca	HM	Opq	Sid	D/A	VG	AC	DC	VP	MGS	Sorting
29	1977.4	78.5	-	-	-	-	-	0.5	-	0.5	-	-	-	0.5	-	20.0	0.19	well
28	1982.3	48.0	-	-	-	0.5	-	1.0	-	-	14.5	-	-	29.5	6.5	-	0.98	mod
27	1986.3	66.5	-	-	-	-	-	1.0	-	0.5	17.0	-	-	4.0	11.0	-	0.20	well
24	2003.6	66.0	-	-	-	1.0	-	2.5	1.5	-	-	-	-	27.5	-	1.5	0.39	mod-well
23	2006.0	72.0	-	-	-	1.0	-	1.0	-	-	-	-	-	25.5	-	0.5	1.25	poor
22	2008.5	62.0	0.5	-	-	1.5	-	2.5	1.0	-	3.5	-	-	27.5	1.5	-	0.64	mod-well
21	2011.4	61.0	-	-	-	-	-	3.5	-	-	2.0	-	-	31.5	1.5	0.5	0.38	mod-well
20	2015.3	61.0	-	-	-	1.5	-	3.0	-	-	2.5	-	-	31.0	0.5	0.5	0.85	mod
19	2016.7	74.5	-	-	-	1.0	-	1.0	-	-	-	-	-	22.5	-	1.0	1.08	mod
18	2024.2	62.0	0.5	-	-	1.0	-	1.0	-	-	1.0	-	-	33.5	1.0	-	0.70	mod-well
15	2046.0	79.0	-	-	-	-	-	2.0	0.5	-	1.5	-	-	17.0	-	-	1.60	poor
14	2049.0	79.5	1.0	-	-	-	-	0.5	-	-	-	-	-	19.0	-	-	1.70	poor
13	2052.9	62.0	0.5	-	-	-	-	1.0	-	-	-	-	-	35.5	-	1.0	0.20	well
12	2058.8	35.5	-	-	-	-	-	0.5	1.0	-	46.5	-	-	14.0	2.5	-	0.62	poor
10	2080.2	69.0	-	-	-	0.5	-	1.0	-	-	-	-	-	29.0	-	0.5	1.51	mod
8	2106.6	65.0	-	-	-	1.5	-	1.5	-	-	2.0	-	-	30.0	-	-	1.60	poor
6	2130.9	46.0	-	-	-	-	-	1.0	-	0.5	22.5	-	-	29.0	1.0	-	0.08	well
4	2152.3	60.0	0.5	-	-	3.0	-	3.0	-	-	-	-	-	33.0	-	0.5	0.88	mod-well
2	2170.2	-	-	-	-	-	-	-	-	0.5	1.5	72.0	13.5	12.5	-	-	-	-
1	2180.1	4.5	-	-	-	-	-	-	-	2.0	12.5	9.0	49.0	23.0	-	-	-	-

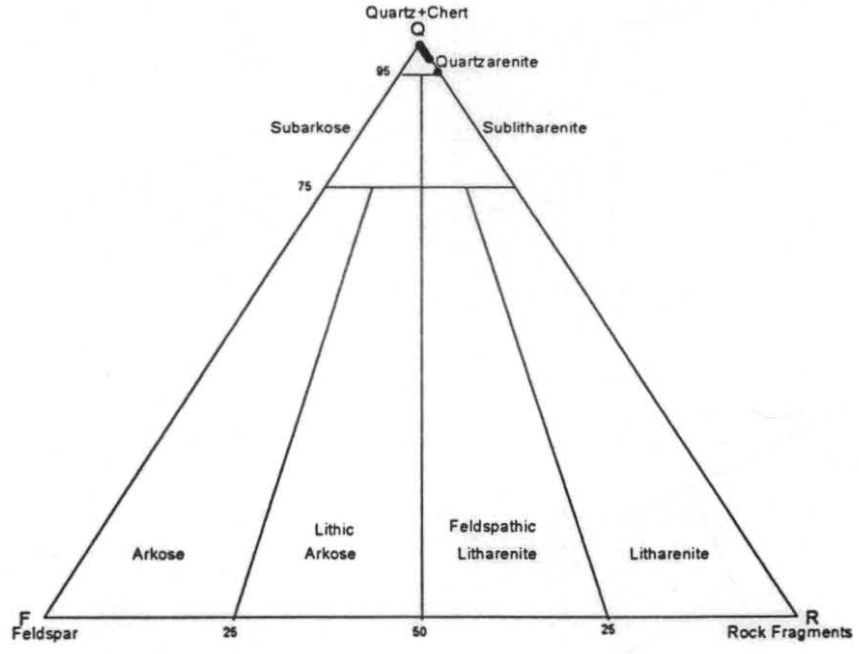
Qtz = quartz Cht = chert Feld = feldspar IRF = igneous rock fragments MRF = metamorphic rock fragments SRF = sedimentary rock fragments Mca = mica HM = heavy minerals Opq = opaques Sid = siderite D/A = dolomite/ankerite VG = volcanic groundmass in volcanic basement samples AC = authigenic clay DC = detrital clay VP = visible porosity MGS = estimated mean grain size (mm)

570418

TABLE 2. QFR COMPOSITIONS

SWC #	Depth (m)	Q Quartz + chert	F Feldspar	R Rock fragments
29	1977.4	100.0	0.0	0.0
28	1982.3	99.0	0.0	1.0
27	1986.3	100.0	0.0	0.0
24	2003.6	98.5	0.0	1.5
23	2006.0	98.6	0.0	1.4
22	2008.5	97.7	0.0	2.3
21	2011.4	100.0	0.0	0.0
20	2015.3	97.6	0.0	2.4
19	2016.7	98.7	0.0	1.3
18	2024.2	98.4	0.0	1.6
15	2046.0	100.0	0.0	0.0
14	2049.0	100.0	0.0	0.0
13	2052.9	100.0	0.0	0.0
12	2058.8	100.0	0.0	0.0
10	2080.2	99.3	0.0	0.7
8	2106.6	97.7	0.0	2.3
6	2130.9	100.0	0.0	0.0
4	2152.3	95.3	0.0	4.7

FIGURE 1. QFR COMPOSITIONS



schist, muscovite bearing/illitic quartzite, quartzite, meta-argillite/siltstone). Mica ranges from 0.5% to 3.5% and consists entirely of muscovite, much of which is coarse grained and partly altered to kaolin. Other framework grains include very minor to rare chert and yellow-brown tourmaline (dravite). All heavy minerals in the sandstones are accounted for by tourmaline, which, as an accessory mineral, is relatively common. Feldspar is absent. Framework grain assemblages are indicative of a low-grade metasedimentary provenance.

Detrital clay exceeds 5% in two samples (#27 & #28), where it forms a dispersed matrix and is concentrated along laminae. In other samples, most detrital clay is concentrated into isolated patches. Detrital clay is typically highly sideritic.

Except in #27 and #29, authigenic clay is abundant, ranging from 14.0% to 35.5% and averaging 27.2%. Samples #27 and #29 contain less than 5% authigenic clay, with #29 being distinguished by its very low (0.5%) content of authigenic clay. Most authigenic clay is kaolin that has formed by partial to complete alteration of muscovite and micaceous/argillaceous metamorphic rock fragments. In many samples, the kaolin has been largely mobilised as a result of sidewall coring to form a uniformly-distributed matrix.

Siderite ranges up to 46.5%, but exceeds 3.5% in only four samples (#6, #12, #27, #28), where it occurs as a finely/medium-crystalline cement and detrital clay/micaceous grain replacement.

Opaques are confined to the finer sandstones, where they do not exceed 0.5% and consist of fine organic fragments and patchy fine pyrite.

Visible porosity is less than 1.6% in all samples except #29, which contains 20.0% visible porosity. Except for #4, #6, #23, #27 and #29, which include relatively intact sandstone fragments, visible porosity values cannot be regarded as reliable due to the effects of impact damage, although it is clear from the high recorded clay contents that all sandstones except #29 were not highly macroporous prior to coring.

Volcanics: SWC #1 is a hydrothermally-altered ?felsic volcanic consisting largely of a groundmass made up of intergrown, anhedral crystals of altered K-feldspar, patchy illitic clay and disseminated opaques, and which contains scattered phenocrysts up 3.0mm in length, many of which are pseudomorphed by sericite and replaced by coarsely-crystalline ankerite and

siderite. Polycrystalline and microcrystalline quartz is associated with some phenocrysts. The groundmass is also cut by thin ankerite veins. Macroporosity is absent.

SWC #2 is composed mainly of coarsely-crystalline dolomite that has largely replaced a volcanic groundmass which, in contrast to that in SWC #1, consists mainly of silicified plagioclase laths and secondary chlorite. K-feldspar and illitic clay are absent. The volcanic appears to have originally been a basalt or basaltic andesite that was considerably more basic than SWC #1. Macroporosity is absent.

4. X-RAY DIFFRACTION ANALYSIS

Sandstones: Quantitative XRD analyses for the 18 sandstone samples are given in Table 3. These analyses complement the thin-section analyses but cannot be compared directly. This is because the thin-section clay contents include microporosity, and therefore total thin-section clay is elevated relative to other grain types. In addition, XRD analyses do not include visible porosity. Therefore, if the sandstone contains significant visible porosity, such as #29, component abundances as determined by XRD analysis will be higher than those determined by thin-section analysis. Finally, XRD analyses include clay-sized quartz that would be included in the point-counted detrital clay content. When these factors are taken into account, there is excellent agreement between the two data sets, particularly in that they show the same variation in quartz (Fig. 2), clay + mica (Fig. 3) and siderite (Fig. 4). As expected given the effect of microporosity on thin-section clay analyses, the amount of clay determined by XRD is generally less than that determined by thin-section analysis, particularly for samples containing greater than 25% clay. In contrast, the amount of quartz and siderite determined by XRD and thin-section analysis are very similar. An exception is #29, for which the XRD analysis indicates significantly more quartz than the thin-section analysis (Fig. 2), this being a reflection of the 20% visible porosity that was recorded for #29 in thin-section.

Quantitative XRD analyses indicate a clay mineral suite consisting entirely of kaolin and subordinate illite/mica. Nearly all detected kaolin would be a product of the decomposition of micaceous/argillaceous grains, except in the two argillaceous samples (#27, #28), where there is probably some detrital kaolin. Detected illite/mica would include fresh muscovite as well as illite that is associated with metamorphic rock fragments and partly decomposed muscovite grains. Non-clay minerals detected by bulk XRD besides quartz and siderite are very minor

TABLE 3. QUANTITATIVE XRD ANALYSIS - WHOLE ROCK

SWC #	Depth (m)	Qtz	Di	Ka	I/M	I/S	Chl	Ca	D/A	Sid	Pyr	KF	Bar
29	1977.4	92.0	-	5.0	2.4	-	-	-	-	0.2	0.4	-	-
28	1982.3	48.8	13.9	11.0	9.0	-	-	-	-	16.7	0.9	-	-
27	1986.3	63.4	4.0	11.0	4.7	-	-	-	-	16.7	0.6	-	-
24	2003.6	63.5	12.0	5.5	6.8	-	-	1.2	-	0.3	0.9	-	9.8
23	2006.0	74.0	15.0	6.5	3.9	-	-	-	-	0.2	-	-	-
22	2008.5	64.9	20.6	-	12.4	-	-	-	-	2.0	-	-	-
21	2011.4	71.0	16.2	6.0	5.9	-	-	-	-	0.9	-	-	-
20	2015.3	71.0	15.7	7.0	4.8	-	-	-	-	1.4	-	-	-
19	2016.7	76.0	15.0	-	7.0	-	-	-	-	-	2.0	-	-
18	2024.2	67.0	19.2	6.9	5.9	-	-	-	-	0.9	-	-	-
15	2046.0	74.0	18.4	-	7.1	-	-	-	-	-	-	-	-
14	2049.0	81.0	9.0	3.0	7.0	-	-	-	-	-	-	-	-
13	2052.9	69.0	15.0	7.4	9.0	-	-	-	-	-	0.3	-	-
12	2058.8	37.7	10.9	-	7.1	-	-	-	-	44.3	-	-	-
10	2080.2	76.0	15.0	1.0	8.0	-	-	-	-	-	-	-	-
8	2106.6	67.2	22.8	-	8.6	-	-	-	-	1.2	-	-	-
6	2130.9	48.5	10.9	-	17.4	-	-	-	-	23.2	-	-	-
4	2152.3	67.0	13.7	8.6	10.0	-	-	-	-	-	-	-	-
2	2170.2	6.7	-	-	-	-	21.0	-	66.8	3.6	0.7	1.0	-
1	2180.1	10.9	-	1.0	7.0	18.7	-	-	11.8	18.5	0.3	31.9	-

Qtz = quartz Di = dickite Ka = kaolinite I/M = illite/mica I/S = mixed layer illite/smectite Chl = chlorite Ca = calcite D/A = dolomite/ankerite Sid = siderite Pyr = pyrite KF = K-feldspar Ba = barite

TABLE 4. QUALITATIVE XRD ANALYSIS - FINE FRACTION

SWC #	Depth (m)	CLAY MINERALS					NON-CLAY MINERALS					MUD CONT	
		Di	Ka	I/M	I/S	Chl	Qtz	KF	D/A	Sid	Pyr	KCl	NaCl*
28	1982.3	A	M	M	-	-	M	-	-	M	-	T	-
27	1986.3	-	A	M	-	-	A	-	-	A	T	T	-
22	2008.5	D	-	M	-	-	A	-	-	M	-	M	T
19	2016.7	D	-	M	-	-	M	-	-	T	-	T	T
15	2046.0	D	-	M	-	-	M	-	-	M	-	T	T
12	2058.8	D	-	M	-	-	M	-	-	A	-	M	T
8	2106.6	D	-	M	-	-	A	-	-	T	-	T	-
6	2130.9	A	-	M	-	-	A	-	-	A	-	T	-
2	2170.2	-	-	-	T	A	M	-	A	M	-	-	-
1	2180.1	-	M	A	A	-	M	A	M	A	T	-	-

Di = dickite Ka = kaolinite I/M = illite/mica I/S = mixed layer illite/smectite Chl = chlorite Qtz = quartz KF = K-feldspar D/A = dolomite/ankerite Sid = siderite Pyr = pyrite MUD CONT = mud contaminants

D = dominant A = abundant M = minor T = trace

*Peak identified as NaCl may also be due to CMC polymer

570423

FIGURE 2. QUARTZ (XRD)/QUARTZ (THIN-SECTION) CROSS-PLOT

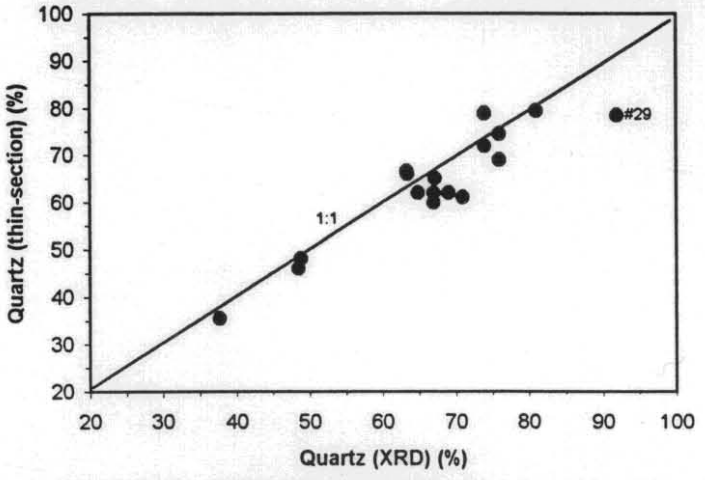


FIGURE 3. CLAY+MICA (XRD)/CLAY+MICA (THIN-SECTION) CROSS-PLOT

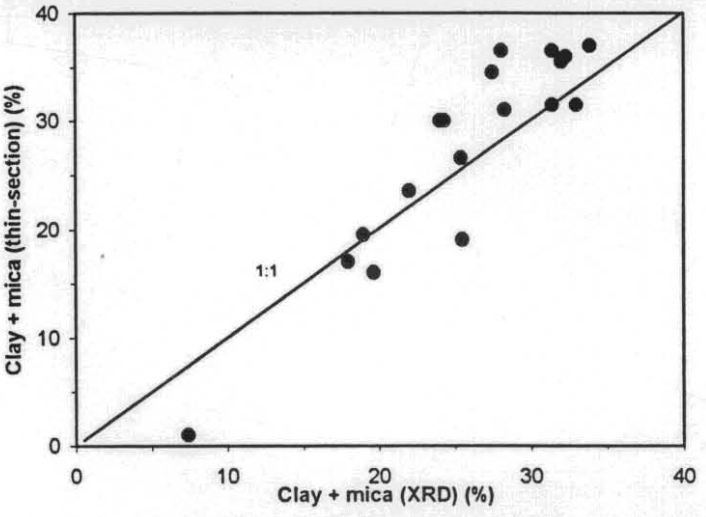
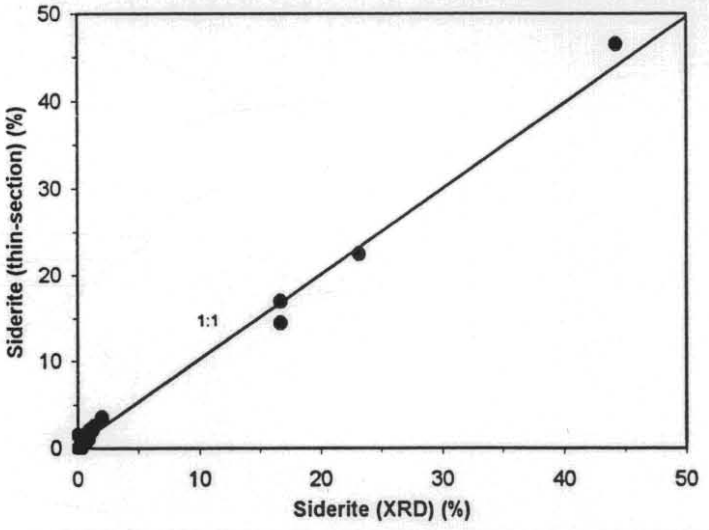
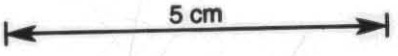


FIGURE 4. SIDERITE (XRD)/SIDERITE (THIN-SECTION) CROSS-PLOT





pyrite and, in #24, calcite and barite.

Qualitative XRD analyses of the fine fractions of eight sandstones (Table 4, Appendix 1) confirm that kaolin is the dominant clay mineral and also show that the kaolin consists entirely of dickite except in the two argillaceous samples (#27, #28), where some kaolin appears to be kaolinite. Non-clay minerals detected by the fine-fraction XRD analyses are quartz, siderite and contaminant KCl and NaCl.

Volcanics: Quantitative XRD analyses confirm that the two volcanics each have a very different mineralogy (Table 3), with #1 containing abundant K-feldspar and illitic clay (illite and illite/smectite), and #2 containing little K-feldspar, no illitic clay and abundant chlorite. In accord with the thin-section data, carbonate is far more abundant in #2 than in #1 and consists of dolomite/ankerite and siderite.

Fine fraction XRD analysis (Table 4, Appendix 1) indicates the presence of abundant illitic clay (illite and illite/smectite with 70-75% illite interlayers) and minor kaolinite in #1 and abundant chlorite and trace illite/smectite in #2. Non-clay minerals detected by fine fraction XRD analysis are quartz, K-feldspar (#1), dolomite/ankerite, siderite and trace pyrite.

5. SANDSTONE DIAGENESIS

Sandstones have been severely affected by diagenesis, with the main diagenetic process being authigenic clay formation. In all sandstones except #27 and #29, there has been extensive kaolinitisation of compacted muscovite and micaceous/argillaceous metamorphic rock fragments to form large grain-sized and over-sized patches of coarsely-crystalline kaolin (Plate 2, Fig. 3), the amount of which exceeds 20% in most sandstones and ranges up to at least 30%. Micaceous/illitic remnants of the precursor grains commonly occur within kaolin patches, and coarse muscovite flakes are commonly partly altered to kaolin. The absence of feldspar could be taken to indicate that some kaolin has also formed by feldspar alteration, but feldspar is absent in #27, in which there has been little authigenic clay formation and no labile grain dissolution, indicating that feldspar was never present in at least this sandstone. The abundance of kaolin indicates that sandstones originally contained a large component of labile grains, even those sandstones that are very coarse grained. Much of the kaolin was mobilised during

sidewall coring to produce a pervasive matrix (Plate 3, Fig. 1), although it is likely that in many areas, kaolin was sufficiently abundant to be already forming a kaolinitic matrix prior to coring.

Finely-crystalline/rhombic siderite cement is extensively developed in #12, where it fills most intergranular areas between framework grains and uncompacted patches of authigenic kaolin (Plate 4, Fig. 1). Siderite is also abundant in #6, #27 and #28, where it occurs as a fine/medium-crystalline detrital clay replacement (Plate 1, Fig. 3) and cement (Plate 4, Fig. 3). In some of the other samples, patchy detrital clay matrix and a few variably altered micaceous grains are partly replaced by fine siderite rhombs.

In most sandstones, framework grain packing density has been increased by grain contact dissolution, which has formed long and embayed grain contacts between adjacent quartzose grains (Plate 2, Fig. 1). Localised microstylolitic grain contacts occur where grain contact dissolution has been promoted by the presence of thin illitic clay films between adjacent quartz grains. The highest frequency of embayed and microstylolitic grain contacts occur in #27, where grain contact dissolution was promoted by the presence of dispersed detrital clay matrix (Plate 1, Fig. 3).

Framework grain packing density has also been increased by the compactional deformation of muscovite flakes and micaceous/argillaceous metamorphic rock fragments (Plate 5, Fig. 1) and also by compaction of authigenic kaolin patches. Most sandstones would have been moderately susceptible to compaction on account of their originally high content of micaceous grains.

Quartz overgrowths are well developed in some of the coarser sandstones, but only have a localised distribution due to the abundance of authigenic clay, which between most quartz grains has prevented quartz overgrowths from nucleating on grain surfaces. In the intact part of #4, some intergranular areas are completely filled by quartz overgrowths (Plate 5, Fig. 1). In contrast, in the finer sandstones at the top of the sampled section (#29), only very thin quartz overgrowths have developed on grain surfaces, even though most intergranular spaces are free of clay (Plate 1, Fig. 1).

Siderite cement in #12 surrounds uncompacted framework grains and uncompacted patches of authigenic kaolin that have formed by micaceous/argillaceous alteration, indicating that siderite predates compaction. Authigenic kaolin is included in quartz overgrowths and has prevented

quartz overgrowths from nucleating on grain surfaces, indicating that kaolin formation by labile grain alteration predates quartz overgrowths. Most authigenic kaolin is dickite rather than kaolinite, implying that the rocks have reached 120°C, this being the approximate temperature at which earlier-formed authigenic kaolinite converts to dickite (Ehrenberg et al., 1993).

6. RESERVOIR QUALITY

The texture of most samples has been severely disrupted by sidewall coring, hence original porosity characteristics are, for the most part, not clear. However, from the few samples where original texture is partly preserved and from the high amounts of clay recorded by both thin-section and bulk rock XRD analysis, it is evident that, except in #29, intergranular porosity has been largely eliminated by authigenic clay formation, compaction, grain contact dissolution, and localised cementation by siderite and quartz overgrowths (e.g., Plate 2, Fig. 1; Plate 5, Fig. 1). In addition, intergranular areas in #27 and #28 are largely filled by sideritic detrital clay (Plate 1, Fig. 3). On this basis, all sandstones except #29 probably contained little (<5%) or no intergranular porosity and, with their consistently high content of clay, would have been largely microporous. The two volcanic samples (#1, #2) would also be microporous since they lack macroporosity and contain significant amounts of secondary clay.

SWC #29 from the top of the sampled section is one of the few samples which includes relatively undamaged sandstone in which original porosity characteristics are preserved. SWC #29 is distinguished by containing little authigenic clay (confirmed by XRD analysis) and abundant (20%) intergranular macroporosity (Plate 1, Fig. 1). Macropores are evenly distributed hence would be well interconnected. Evidently, unlike the deeper sandstone samples, SWC #29 originally contained few micaceous grains and thus was not susceptible to clay alteration and compaction.

570427

7. CONCLUSIONS

1) Sidewall core samples from White Ibis-1 are badly impact damaged, very fine to very coarse grained quartzarenites except for the two deepest samples (#1, #2), which are highly altered volcanics that are partly replaced by carbonate. Framework grains in the sandstones include muscovite, low grade metasedimentary rock fragments, chert and tourmaline. Sandstone detrital composition is indicative of a low grade metasedimentary provenance.

2) Except for the top sample (#29), which is a clean sandstone, sandstones contain abundant clay, most of which is kaolin that has formed by alteration of muscovite and micaceous/argillaceous metamorphic rock fragments. Minor detrital clay also occurs in some sandstones. Most kaolin is dickite rather than kaolinite.

3) Authigenic minerals in the sandstones besides kaolin include illite, siderite and quartz (as overgrowths). Siderite formed prior to compaction, and quartz overgrowths formed after labile grain alteration to kaolin (kaolinite). Conversion of authigenic kaolinite to dickite suggests that formation temperatures have reached at least 120°C.

4) Excluding #29, macroporosity in the sandstones is low (<1.6%), although the amount of macroporosity could not be reliably determined for most sandstones due to the effects of severe impact damage. However, the indications are that macroporosity would not have exceeded 5%. In contrast, #29 contains 20.0% visible macroporosity. Porosity reduction has resulted from authigenic clay formation, compaction, grain contact dissolution, and localised siderite and quartz overgrowth cementation.

5) Containing little or no macroporosity and large amounts of clay, sandstones would be highly microporous. SWC #29 is an exception, being a clean, highly macroporous sandstone that would be at least moderately permeable.

570428

REFERENCES

Ehrenberg, S. N., Aagaard, P., Wilson, M. J., Fraser, A. R. and Duthie, D. M. L., 1993, Depth-dependent transformation of kaolinite to dickite in sandstones of the Norwegian continental shelf. *Clay Minerals*, 28, p. 325-352.

570429

APPENDIX 1.

X-RAY DIFFRACTOGRAMS

(FINE FRACTION)

Key to abbreviations:

An – ankerite

C – chlorite

D – dickite

Do – dolomite

Go - ?gorceixite [$BaAl_3(PO_4)_2(OH)_5$]

I – illite/mica

I/S – illite/smectite

K - kaolinite

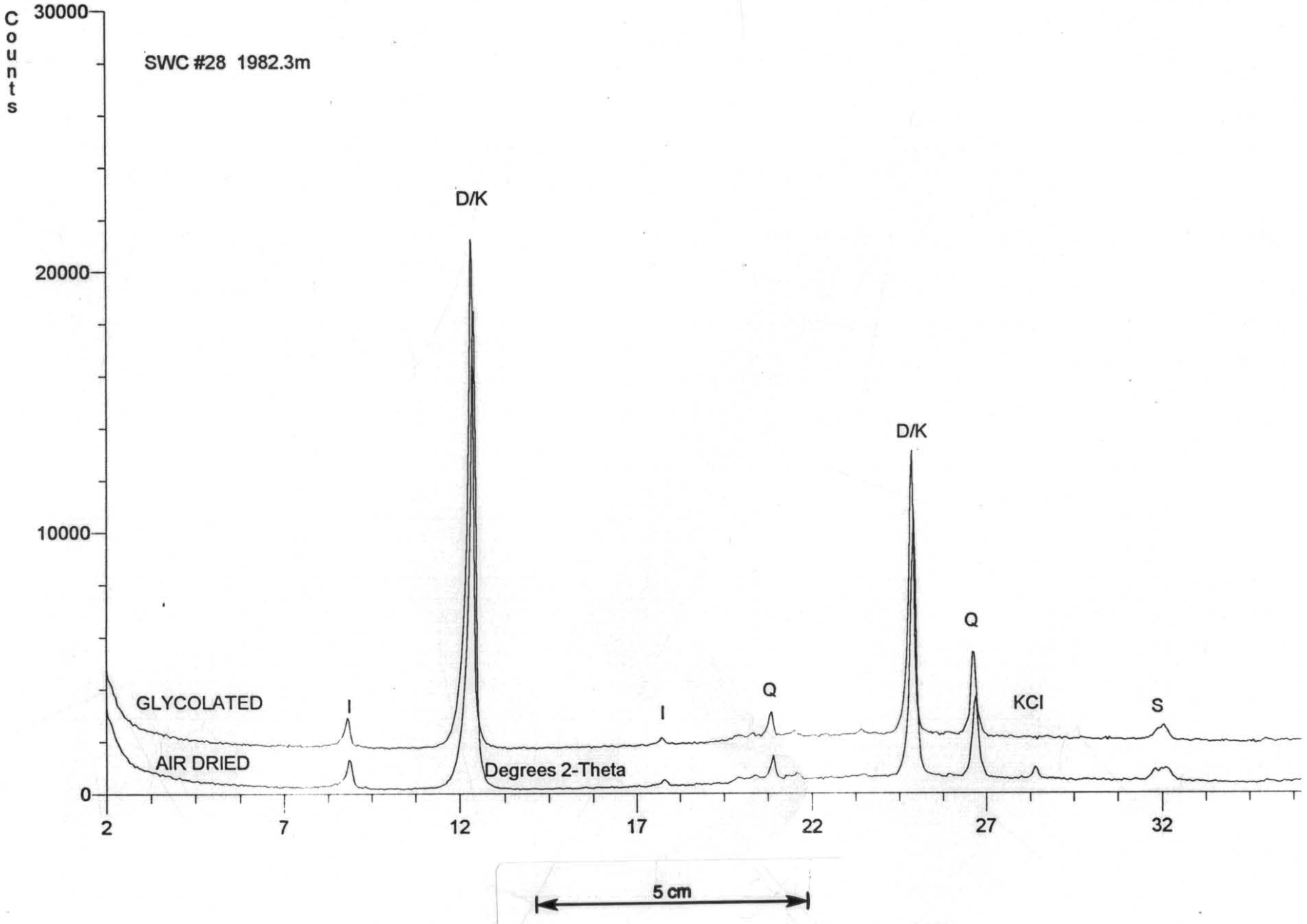
KF - K-feldspar

Py - pyrite

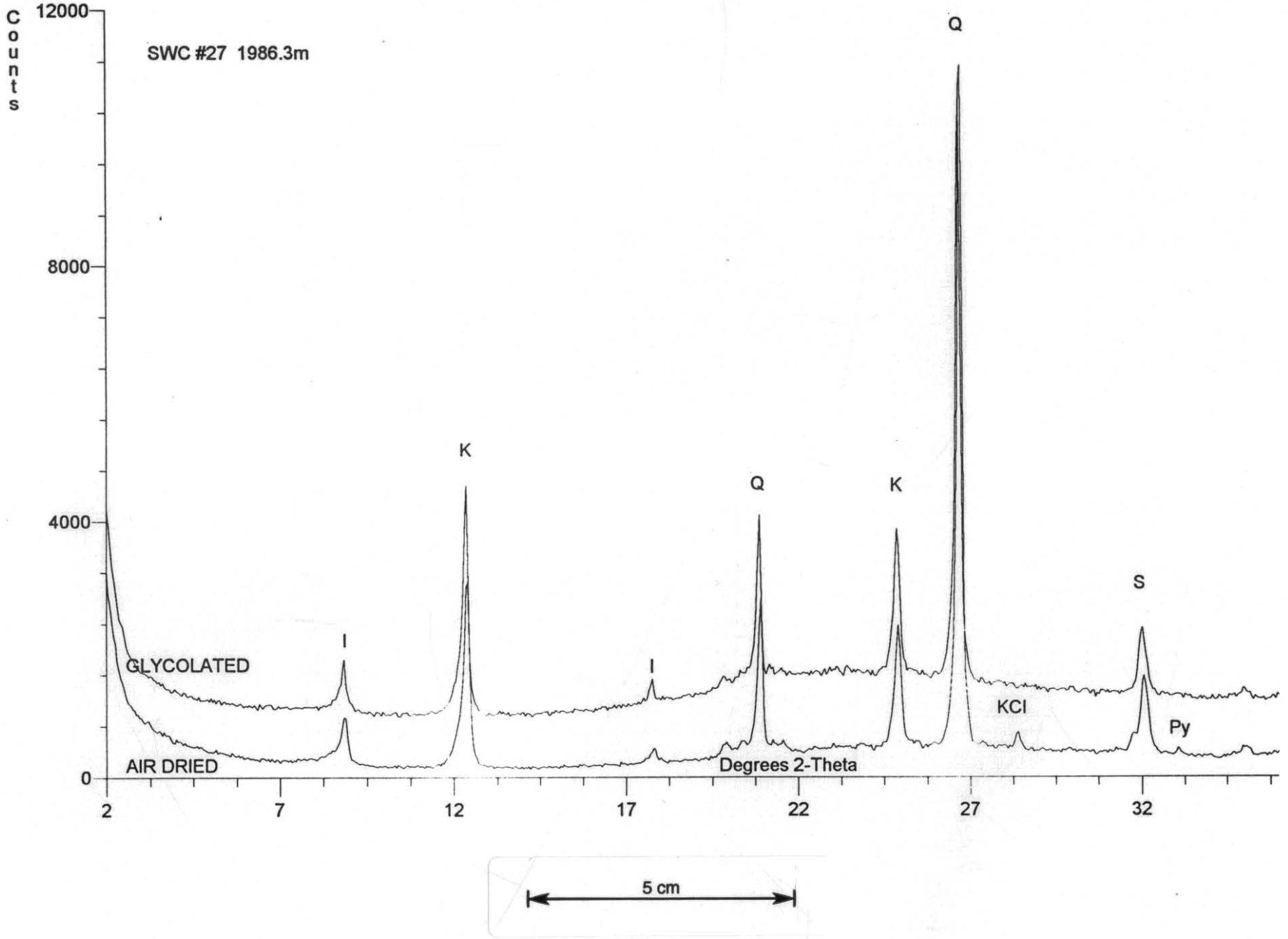
Q – quartz

S - siderite

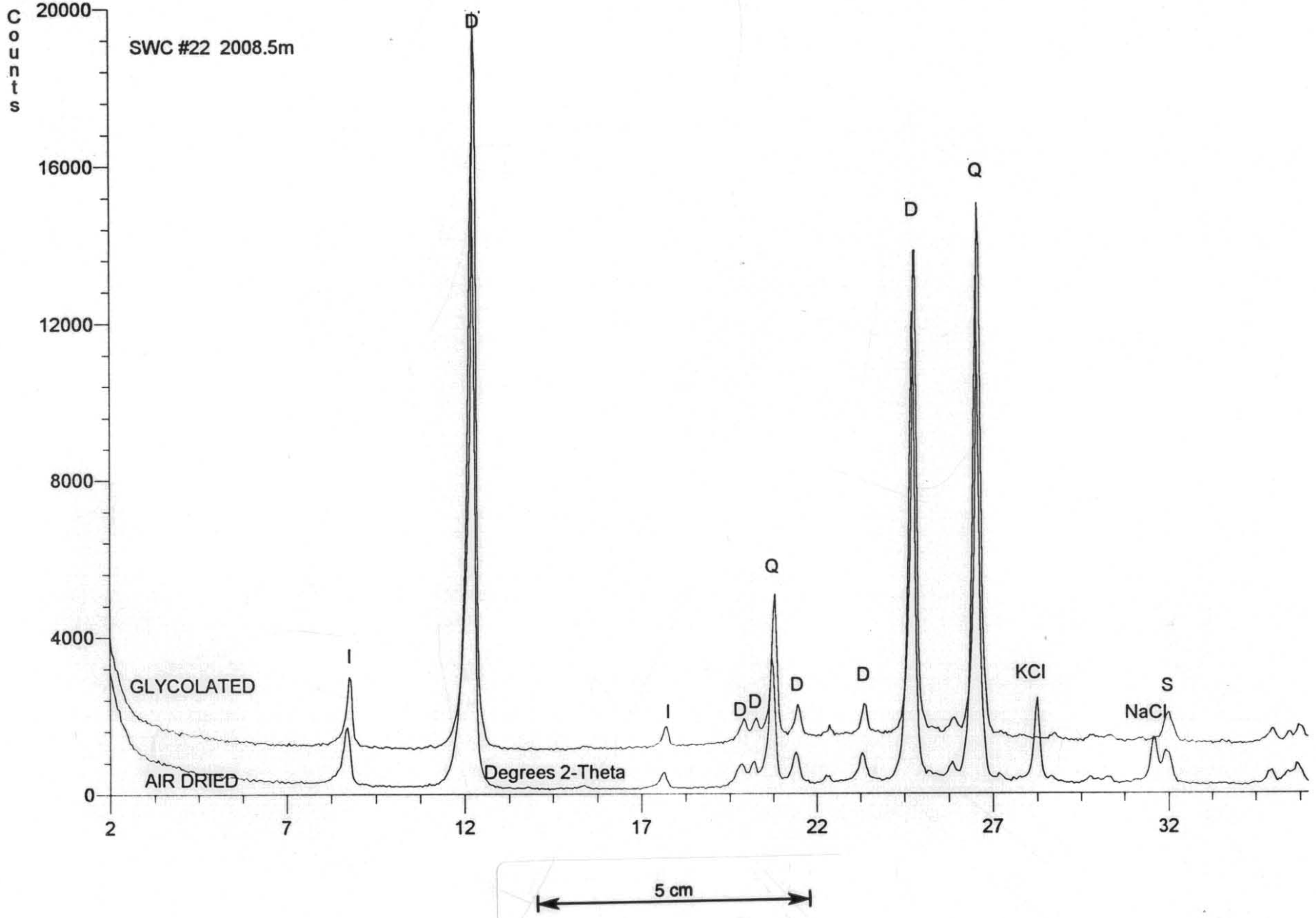
570430


Counts
30000
20000
10000
0
SWC #28 1982.3m
D/K
D/K
Q
Q
I
I
S
KCl
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
5 cm

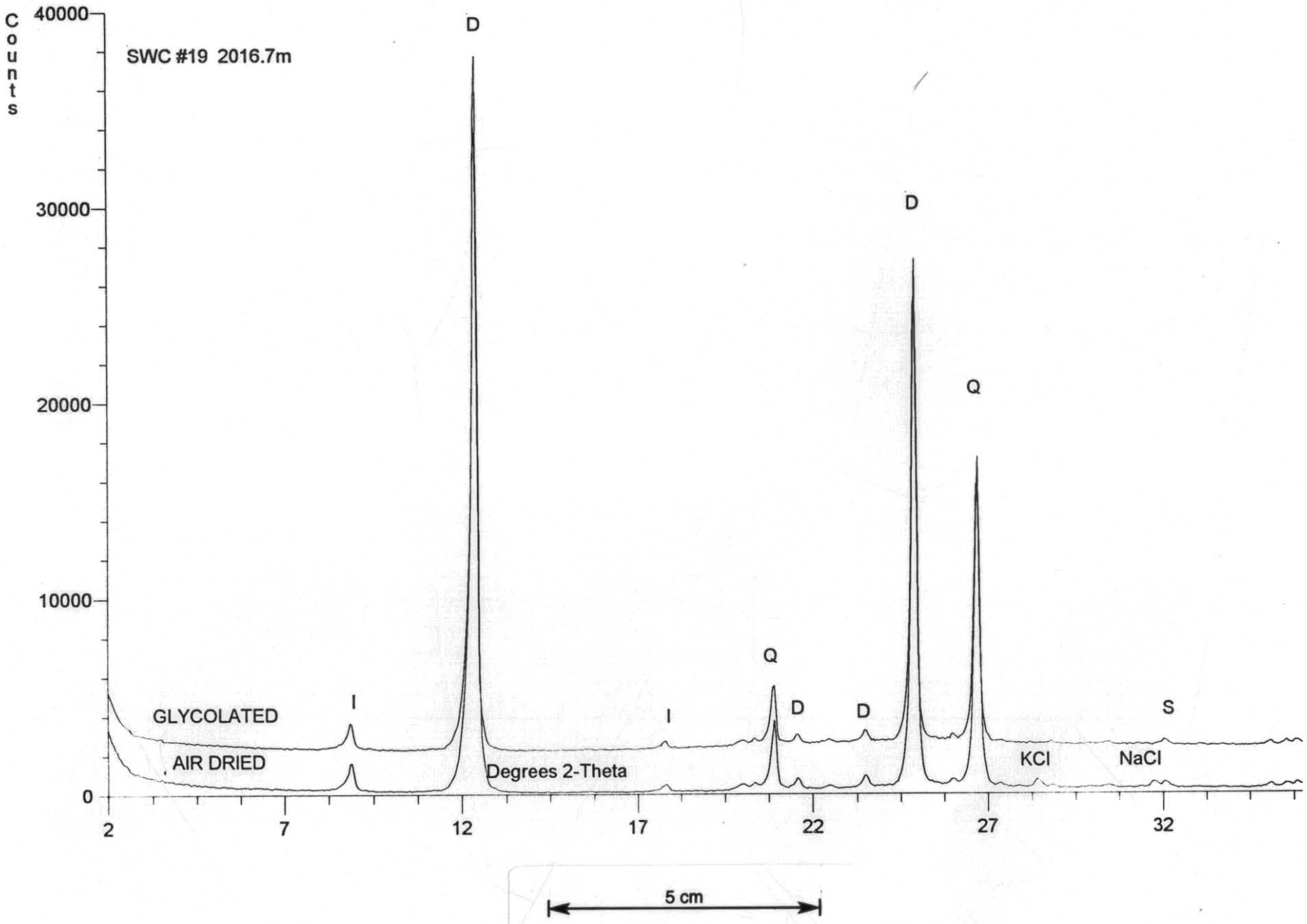
570431


Counts
12000
8000
4000
0
SWC #27 1986.3m
GLYCOLATED
AIR DRIED
I
K
I
Q
K
Q
KCl
S
Py
2
7
12
17
22
27
32
Degrees 2-Theta
5 cm

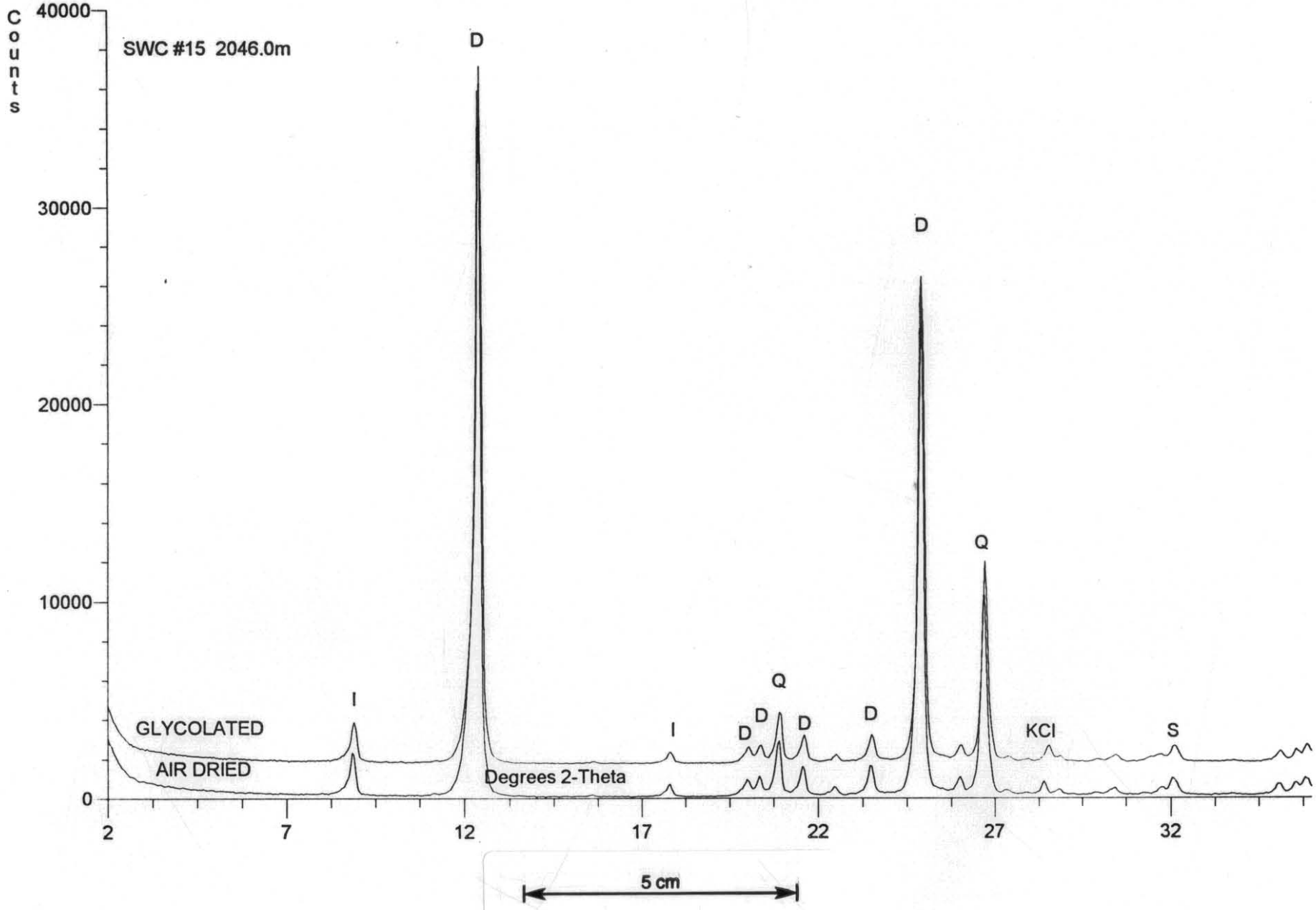
570432


Counts
20000
16000
12000
8000
4000
0
SWC #22 2008.5m
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
D
I
Q
D
D
D
D
Q
KCl
NaCl
S
5 cm

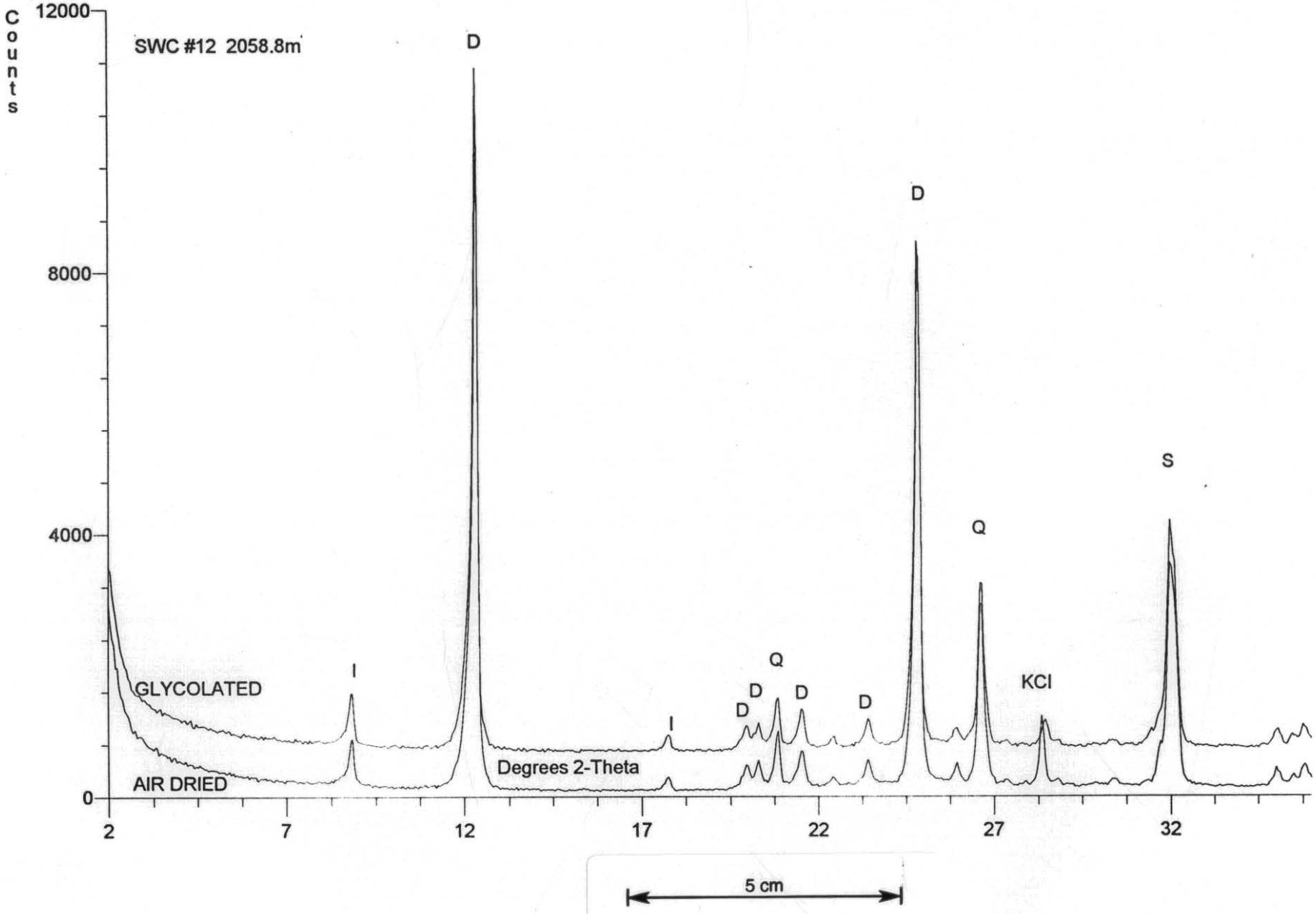
570433


Counts
40000
30000
20000
10000
0
SWC #19 2016.7m
D
D
Q
Q
I
I
D
D
S
GLYCOLATED
AIR DRIED
KCl
NaCl
Degrees 2-Theta
2
7
12
17
22
27
32
5 cm

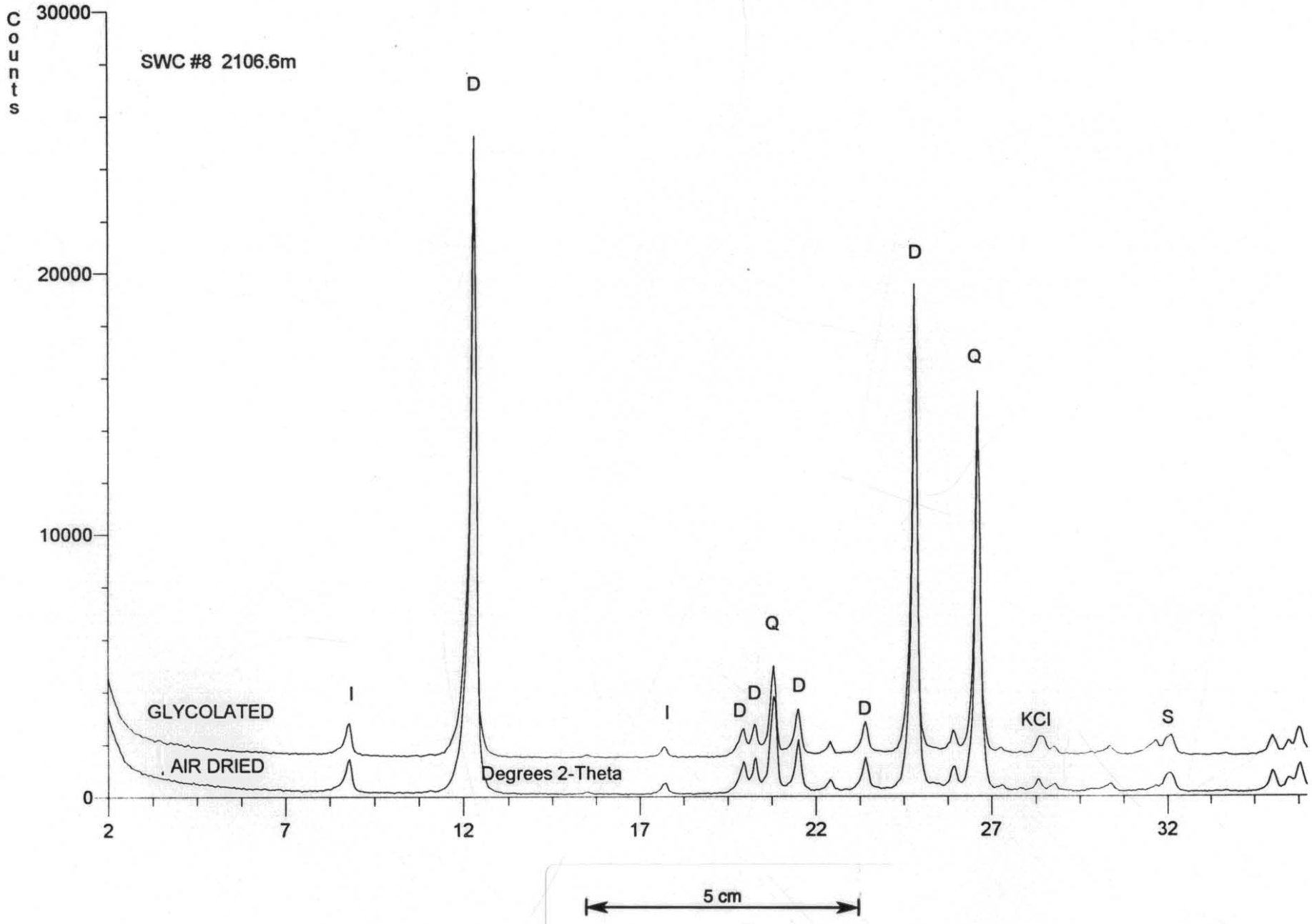
570434


Counts
40000
30000
20000
10000
0
SWC #15 2046.0m
D
D
Q
Q
I
I
D
D
D
D
KCl
S
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
5 cm

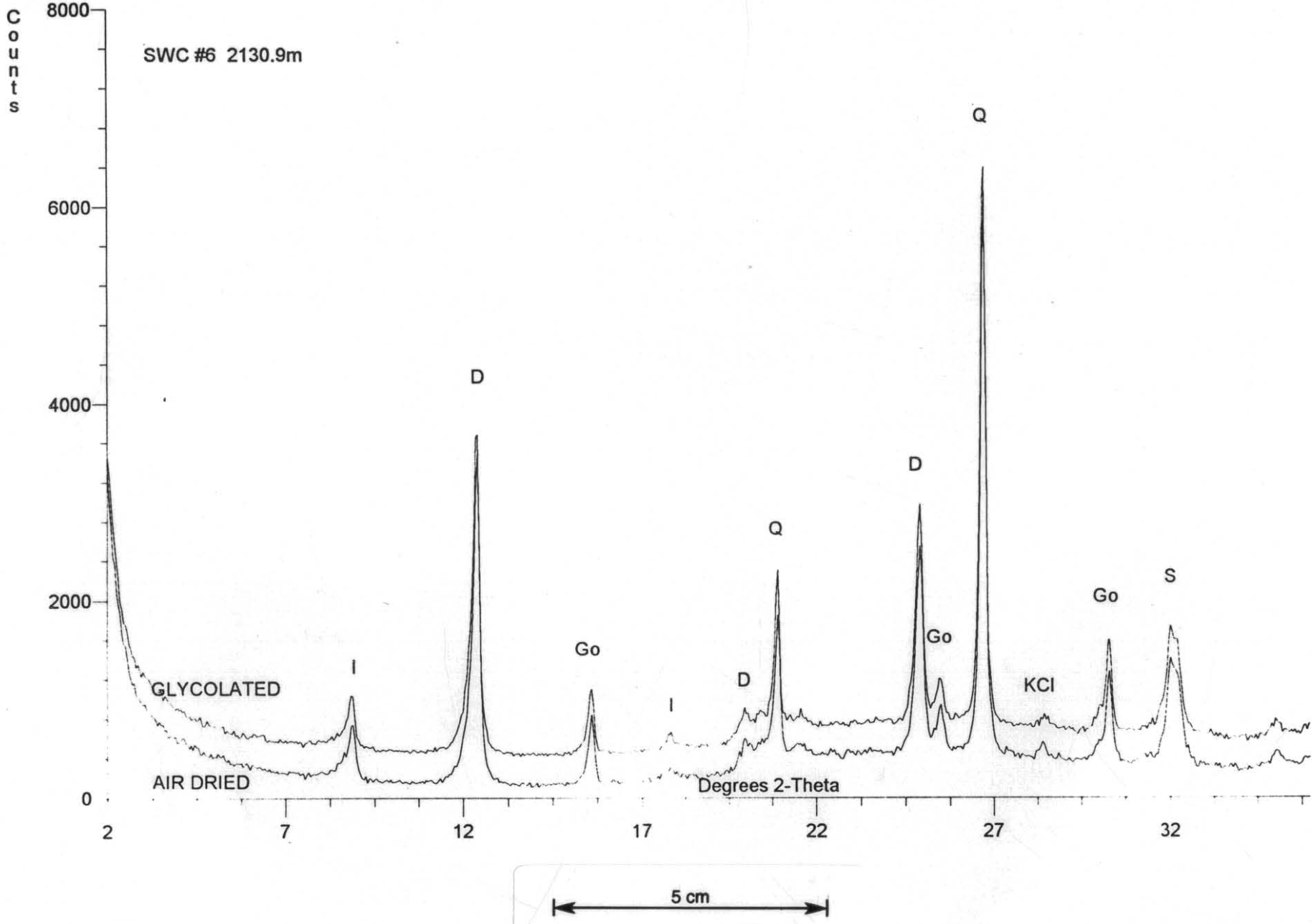
570435


Counts
12000
8000
4000
0
SWC #12 2058.8m
D
D
Q
Q
S
I
I
D
D
D
D
KCl
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
5 cm

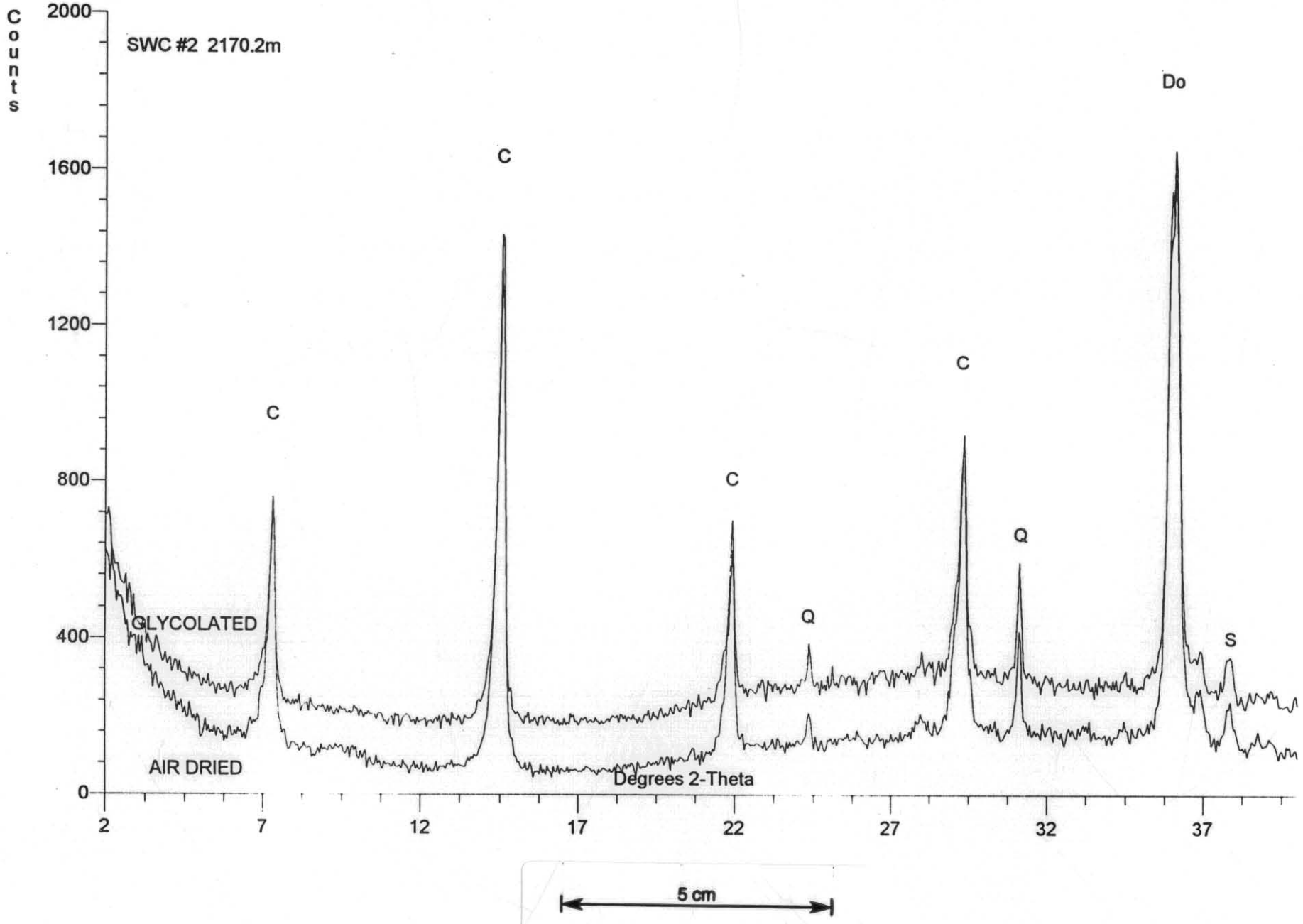
570436


Counts
30000
20000
10000
0
SWC #8 2106.6m
D
D
Q
Q
D
D
D
D
I
I
KCl
S
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
5 cm

570437


Counts
8000
6000
4000
2000
0
SWC #6 2130.9m
GLYCOLATED
AIR DRIED
I
D
Go
I
D
Q
D
Q
Go
KCl
Go
S
2
7
12
17
22
27
32
Degrees 2-Theta
5 cm

570438


Counts
2000
1600
1200
800
400
0
SWC #2 2170.2m
C
C
C
C
Q
Q
Do
S
GLYCOLATED
AIR DRIED
Degrees 2-Theta
2
7
12
17
22
27
32
37
5 cm

570439

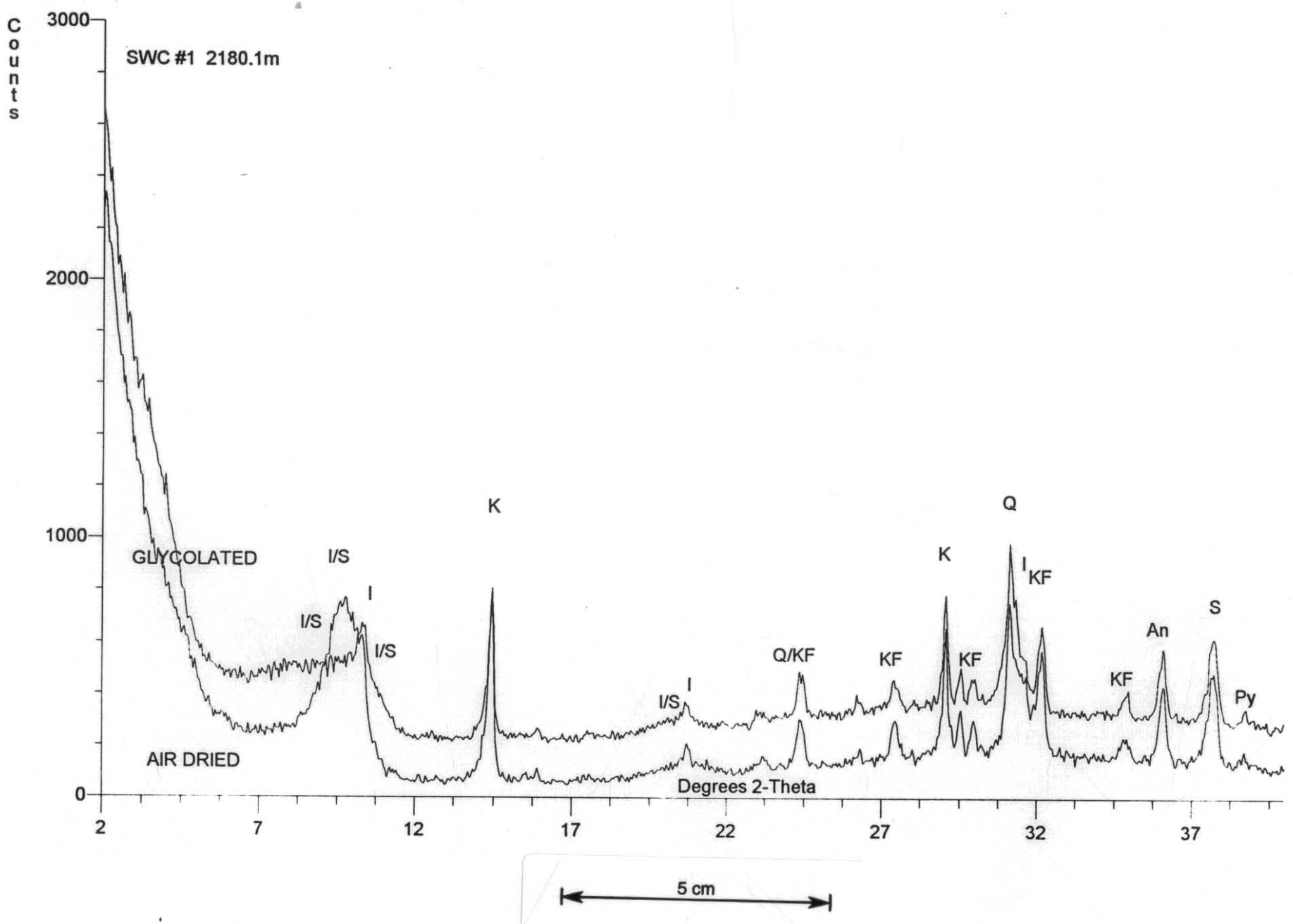

Counts
3000
2000
1000
0
SWC #1 2180.1m
GLYCOLATED
AIR DRIED
I/S
I/S
I
I/S
K
I/S
I
Q/KF
KF
K
KF
Q
I
KF
KF
An
S
Py
2
7
12
17
22
27
32
37
Degrees 2-Theta
5 cm

PLATE 1

SWC #29 1977.4m

FIGURE 1 Plane polarised light

FIGURE 2 Crossed polarisers

Unlike the deeper sandstone samples, this fine grained sandstone contains abundant intergranular macroporosity (P) and only very minor authigenic kaolin (K). The sandstone evidently originally contained few micaceous grains (M), which is the main source for authigenic kaolin in the highly kaolinitic deeper sandstones. Some quartz grains are enveloped by small overgrowths (QO) that have little impact on reservoir quality.

SWC #27 1986.3m

FIGURE 3 Plane polarised light

FIGURE 4 Crossed polarisers

In this fine grained sandstone, intergranular areas are filled by dispersed detrital clay matrix (C) that has been largely replaced by fine grained siderite (S). Embayed and sutured grain contacts (arrow) occur between adjacent quartz grains that are separated by clay films that promoted grain contact dissolution.

5 cm

570441

PLATE 1

FIGURE 1

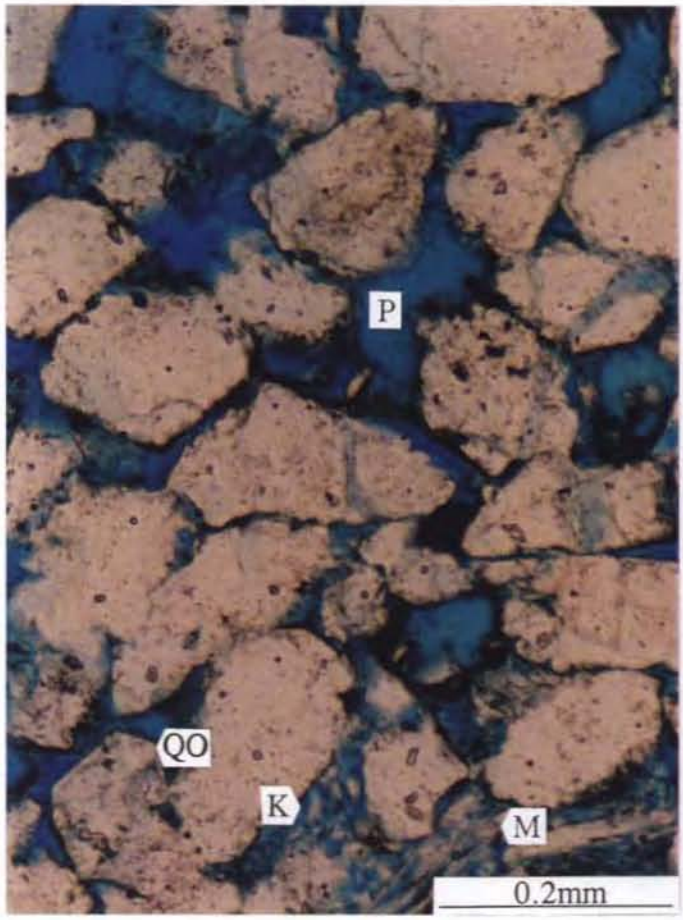


FIGURE 2

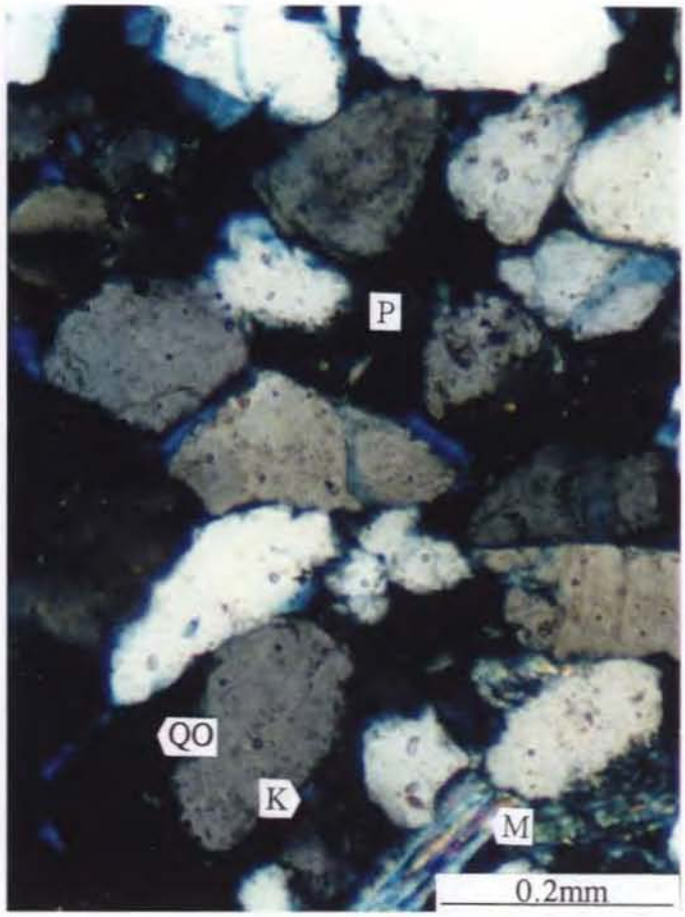


FIGURE 3

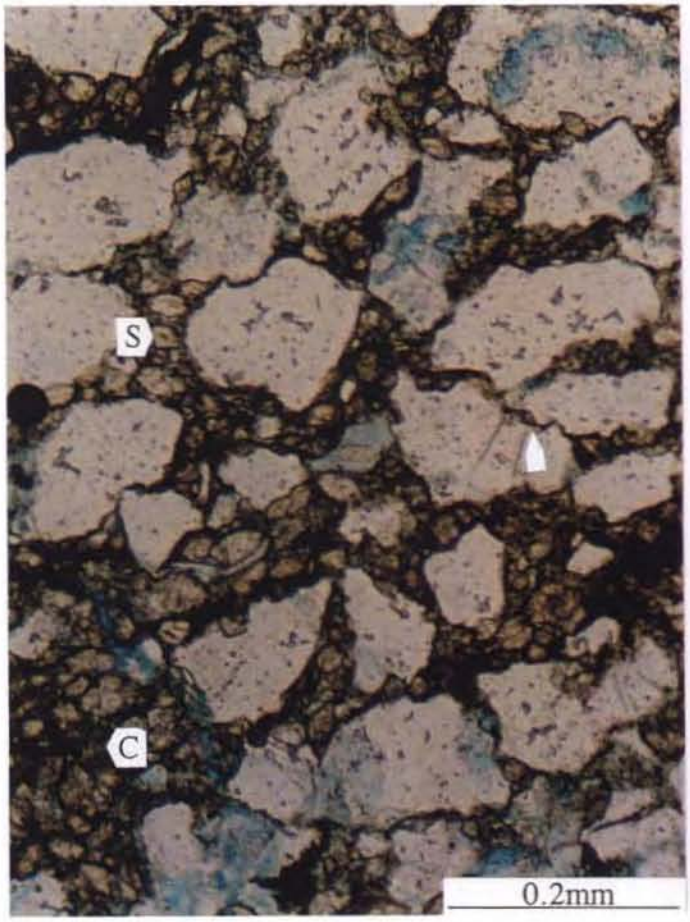


FIGURE 4

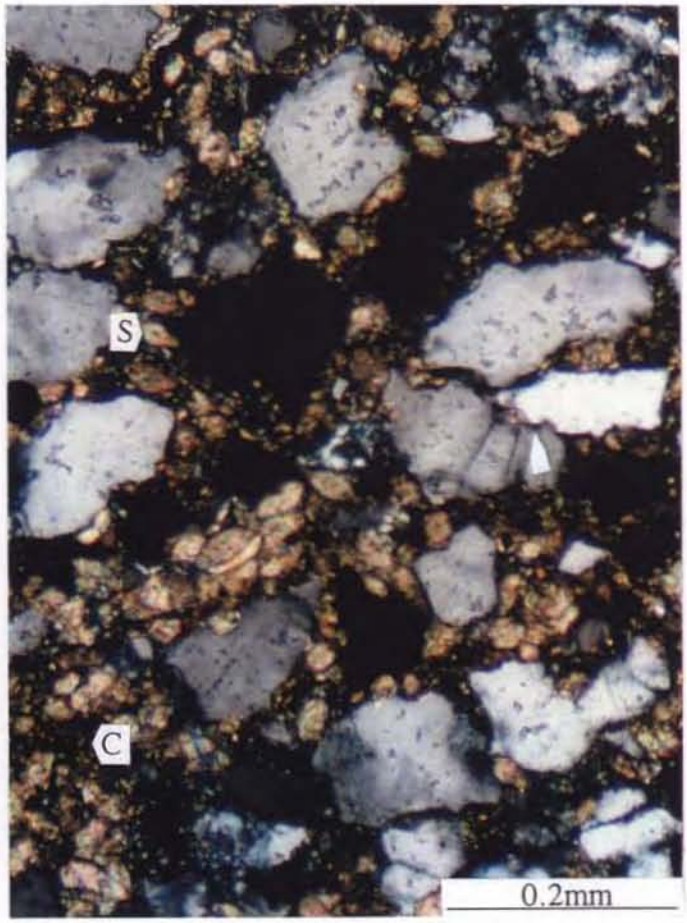


PLATE 2

SWC #23 2006.0m

FIGURE 1 Plane polarised light

FIGURE 2 Crossed polarisers

These micrographs show the only intact area of a severely impact-damaged, very coarse grained, quartzose sandstone. Within this area, all intergranular spaces are filled by authigenic kaolin (K) that formed by alteration of micaceous grains, and there has been further intergranular porosity loss by grain contact dissolution, which has produced long and embayed grain boundaries (arrow).

SWC #20 2015.3m

FIGURE 3 Plane polarised light

FIGURE 4 Crossed polarisers

Impact-damaged sandstone in which intergranular areas are mainly filled by mobilised authigenic kaolin (K) that formed by alteration of coarse flakes of muscovite (M). Some intergranular areas are also occupied by siderite (S).

5 cm

570443

PLATE 2

FIGURE 1

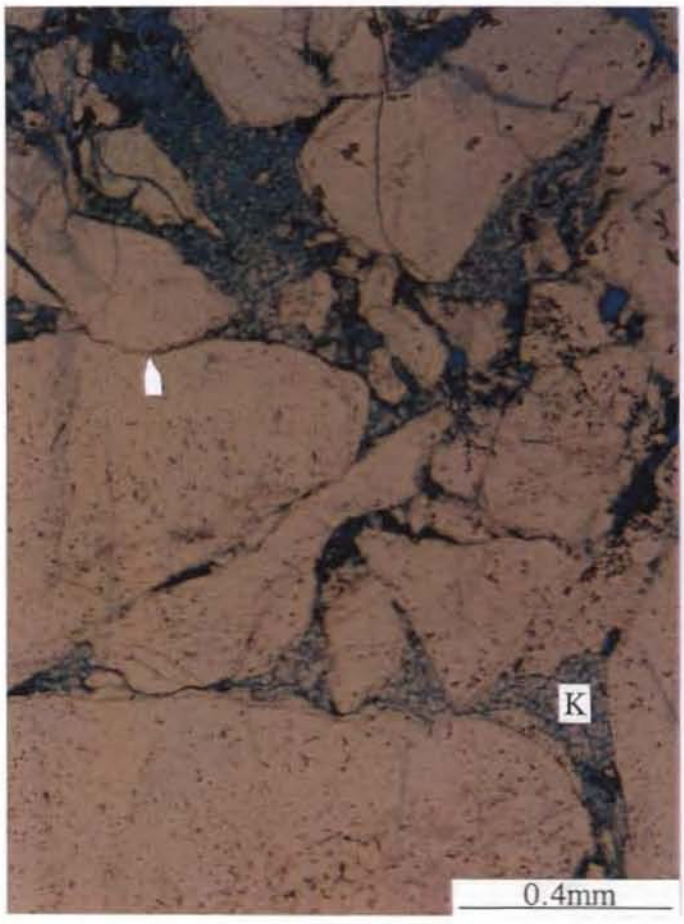


FIGURE 2

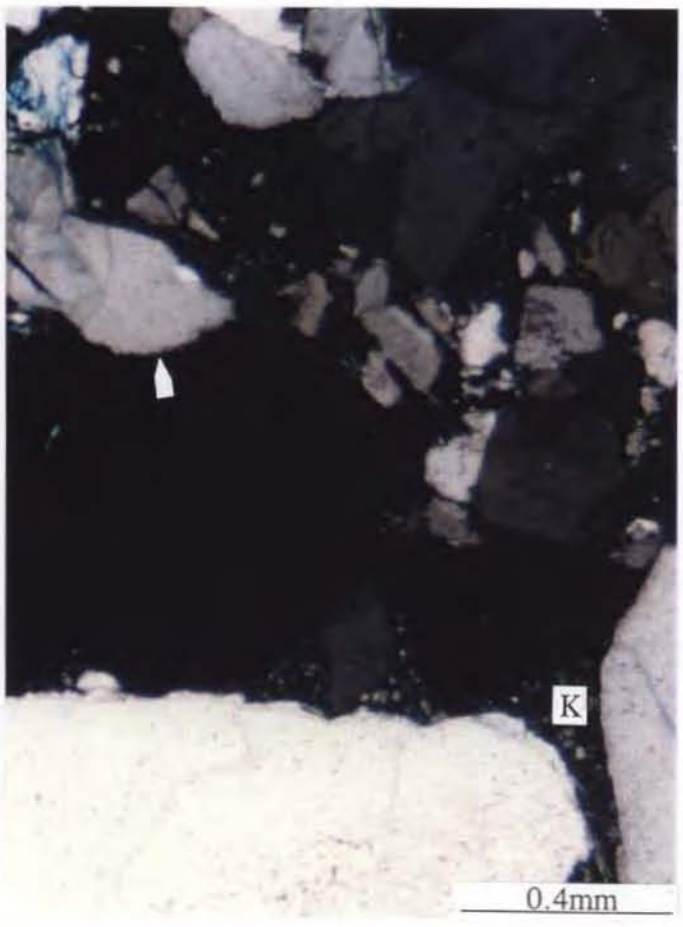


FIGURE 3

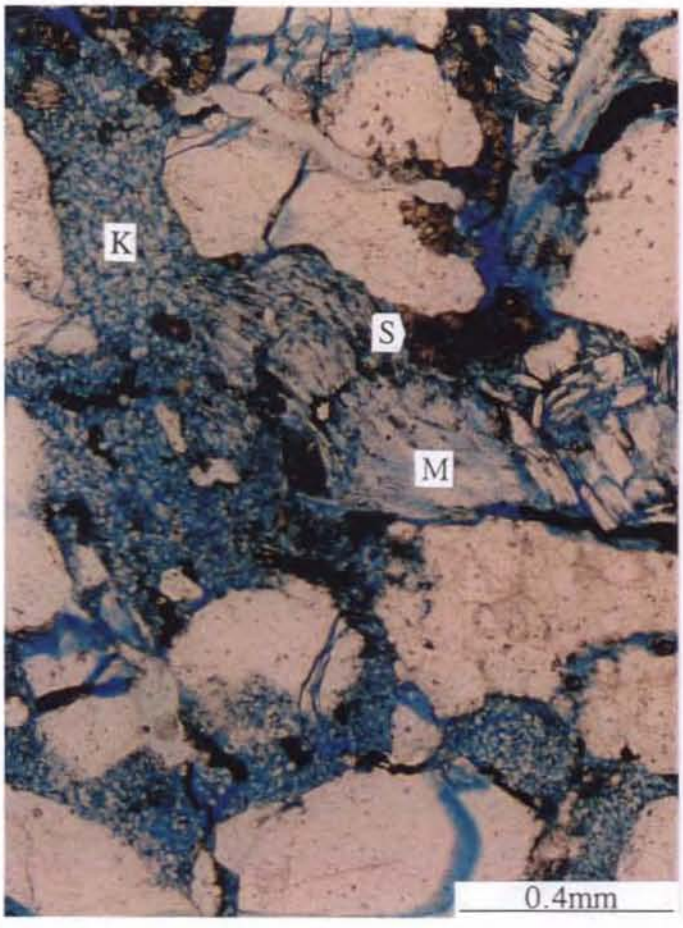


FIGURE 4

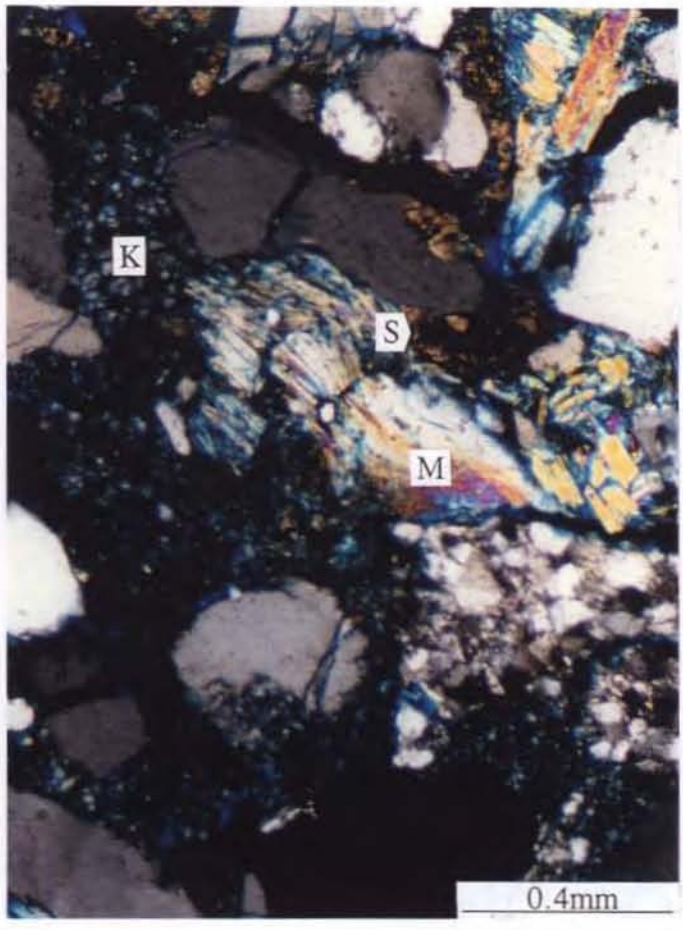


PLATE 3

SWC #15 2046.0m

FIGURE 1 Plane polarised light

FIGURE 2 Crossed polarisers

Extensively impact-damaged, very coarse grained sandstone in which areas between fractured quartz grains are largely filled by mobilised kaolin (K). Despite its coarse grain size, the sample would have been largely microporous due to the presence of abundant authigenic kaolin. Fine grained siderite (S) is associated with a rare patch of brown clay.

SWC #13 2052.9m

FIGURE 3 Plane polarised light

FIGURE 4 Crossed polarisers

This fine grained sandstone contains abundant authigenic kaolin (K) which, throughout most of the sample, forms a uniformly-distributed, grain-supporting matrix. Although the kaolin has been largely mobilised by sidewall coring, it appears that most intergranular areas were originally occupied by kaolin. Rare quartz overgrowths (QO) have developed on grain surfaces in the few places where intergranular spaces were not occupied by kaolin.

5 cm

570445

PLATE 3

FIGURE 1

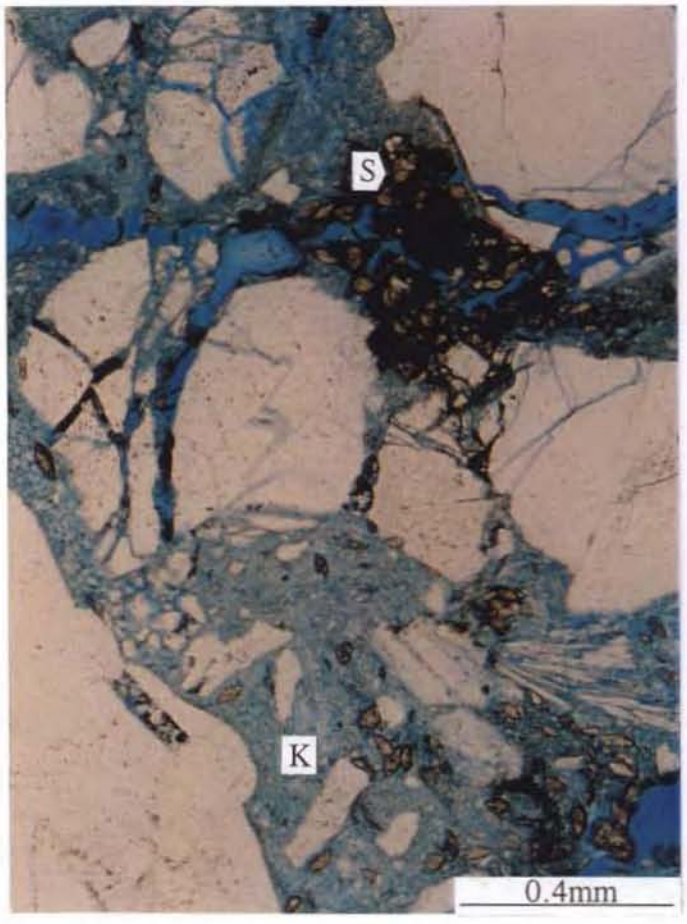


FIGURE 2

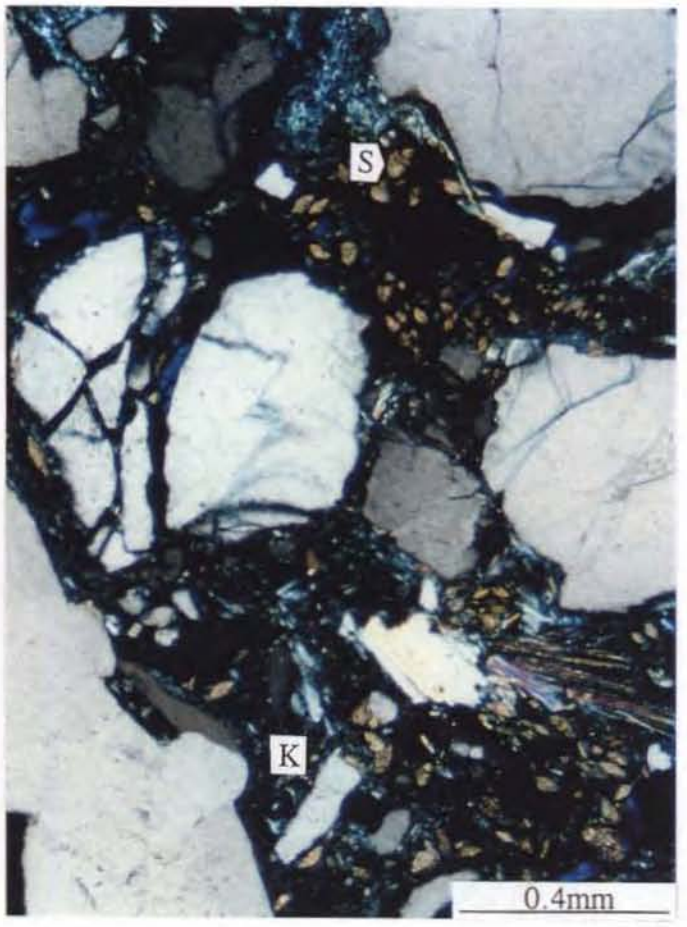


FIGURE 3

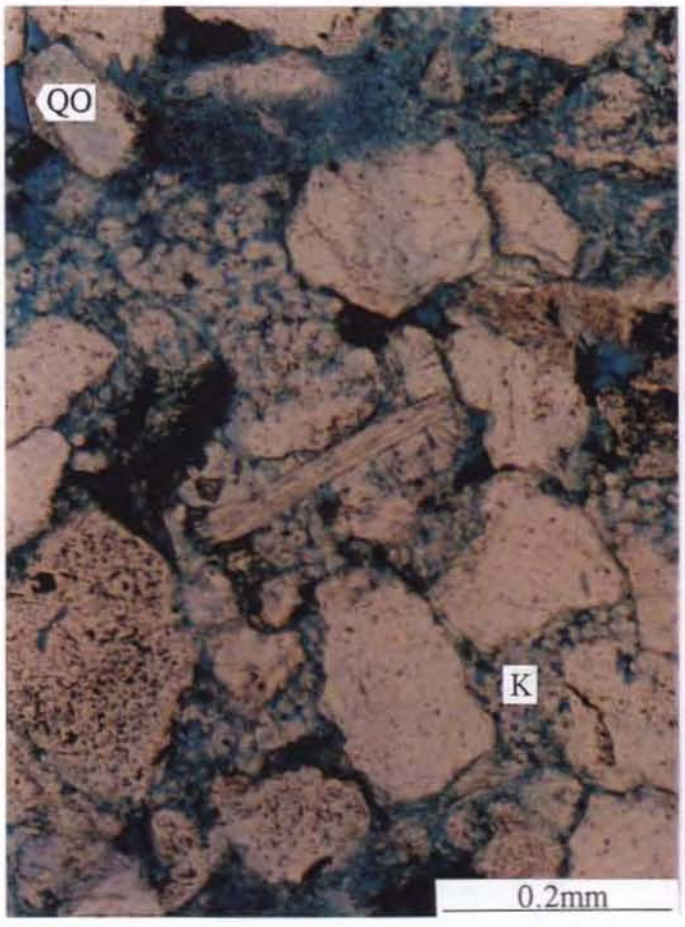


FIGURE 4



PLATE 4

SWC #12 2058.8m

FIGURE 1 Plane polarised light

FIGURE 2 Crossed polarisers

All intergranular spaces in the field of view are occupied by finely-crystalline siderite cement (S). Patches of kaolin (K) mark the locations of labile grains that have altered.

SWC #6 2130.9m

FIGURE 3 Plane polarised light

FIGURE 4 Crossed polarisers

Very fine grained sandstone in which all intergranular areas are occupied by siderite cement (S) and very fine grained, highly microporous kaolin (K).

5 cm

570447

PLATE 4

FIGURE 1

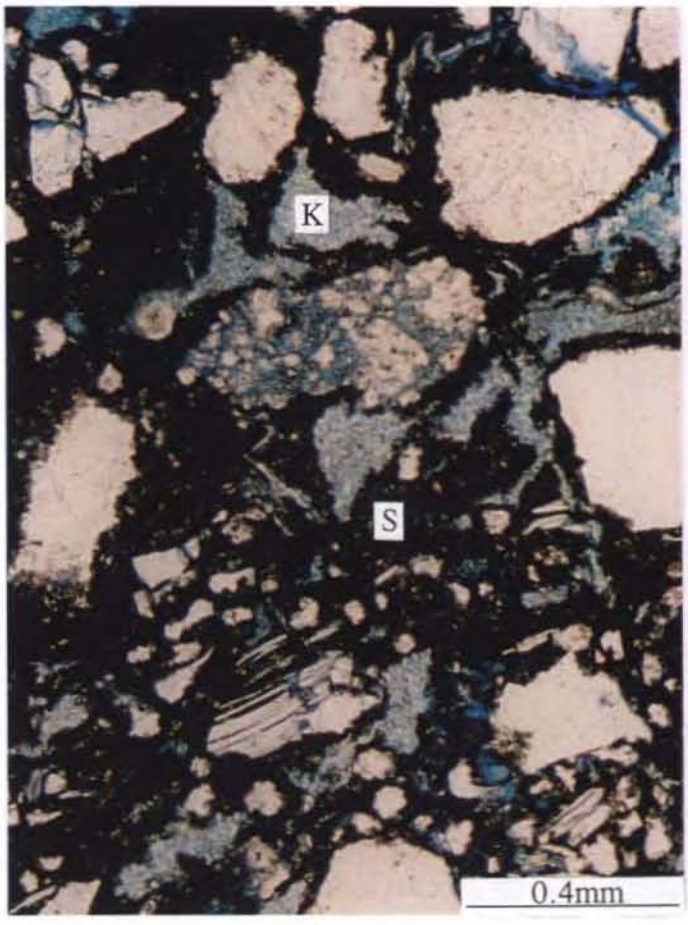


FIGURE 2

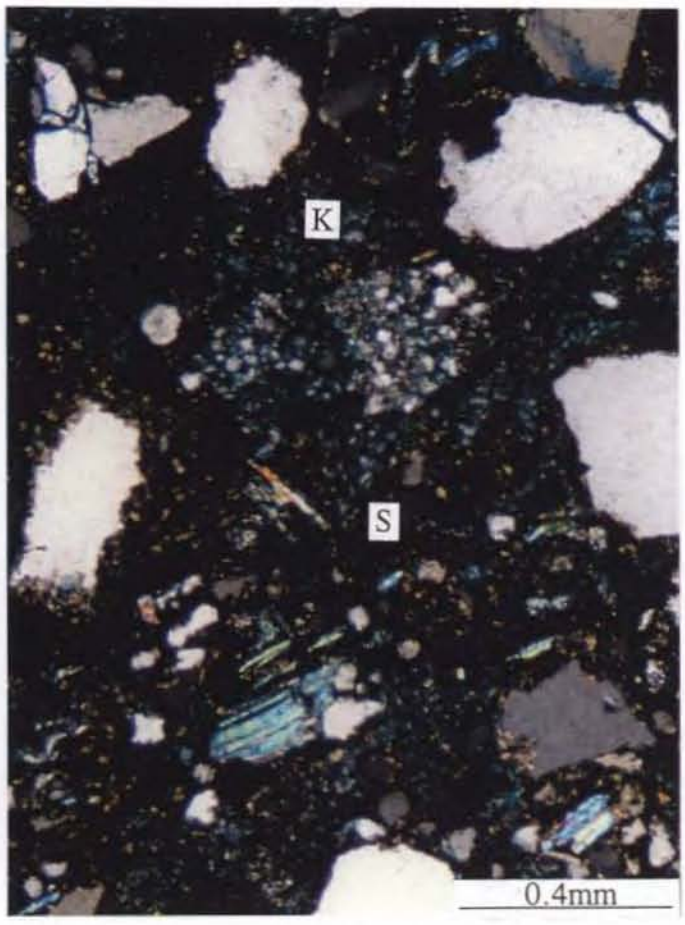


FIGURE 3

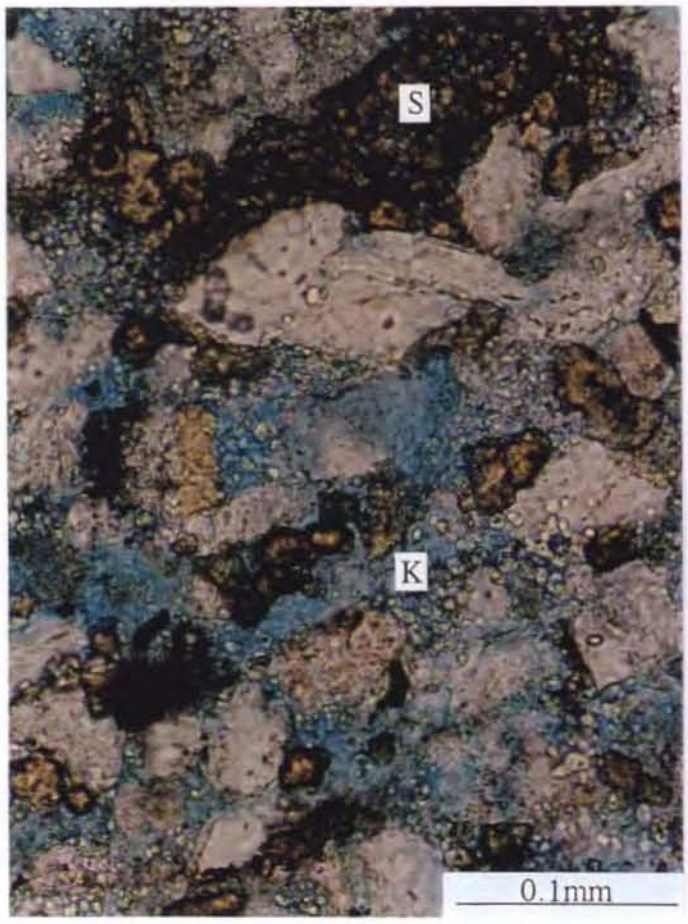


FIGURE 4



PLATE 5

SWC #4 2152.3m

FIGURE 1 Plane polarised light

FIGURE 2 Crossed polarisers

These micrographs show an intact part of a badly impact-damaged sandstone, where intergranular porosity has been largely eliminated by advanced quartz overgrowth (QO) cementation, authigenic kaolin (K) formation, and compaction of an argillaceous metasedimentary rock fragment (MRF) and a muscovite grain (M). Small, largely kaolin-choked, primary intergranular macropores (PP) are preserved where quartz overgrowths and authigenic kaolin do not completely occupy all available space. Macropores in the sample appear to only have a sporadic distribution and thus would not be conducive to high permeability.

SWC #1 2180.1m

FIGURE 3 Plane polarised light

FIGURE 4 Crossed polarisers

Feldspathic volcanic groundmass (GM) containing altered (sericitised) phenocrysts (arrow) that are partly replaced by ankerite (An).

5 cm

570449

PLATE 5

FIGURE 1

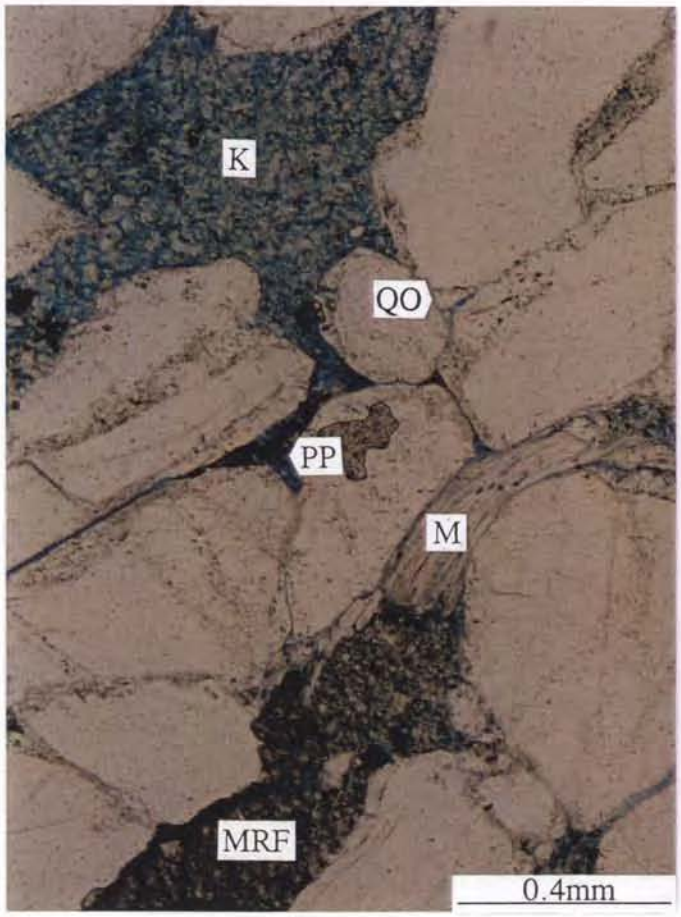


FIGURE 2

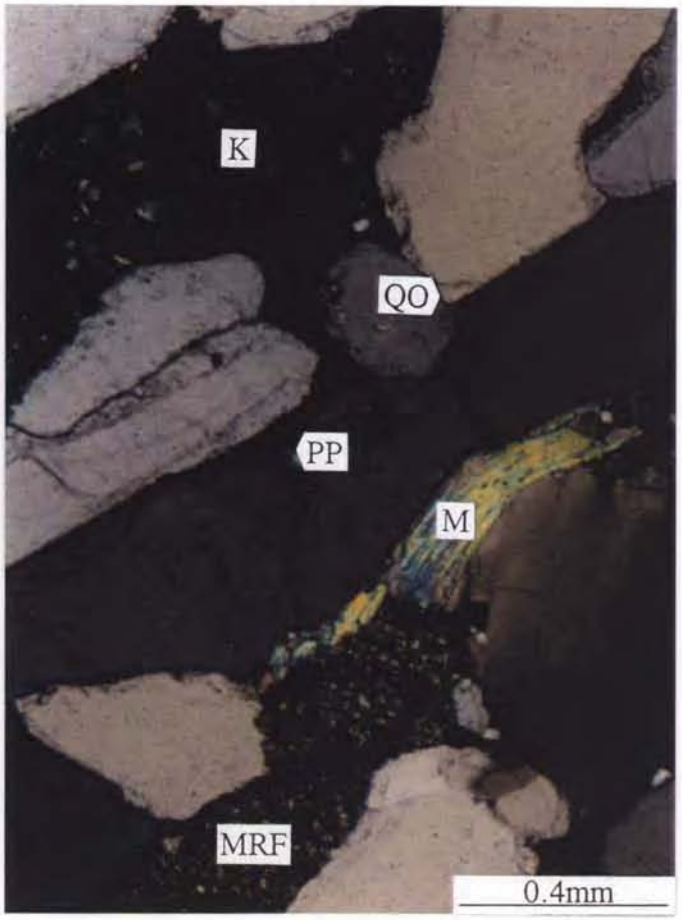


FIGURE 3



FIGURE 4



570450

APPENDIX 14

PALYNOLOGY

By

MORGAN PALAEO ASSOCIATES

WHITE IBIS 1

MORGAN PALAEO ASSOCIATES
PALYNOLOGICAL/PETROLEUM GEOLOGICAL CONSULTANTS
POSTAL ADDRESS: Box 161, Maitland, South Australia 5573
DELIVERIES: 1 Shannon Tce, Maitland, South Australia 5573
Phone (08) 8832 2795 Fax (08) 8832 2798

570451

PALYNOLOGY OF WHITE IBIS-1, T/18P BASS BASIN, OFFSHORE TASMANIA, AUSTRALIA

by

ROGER MORGAN

for **PREMIER OIL**

AUGUST 1998

REF:BAS.RPWIBIS1



570452

PALYNOLOGY OF WHITE IBIS-1, T/18P BASS BASIN, OFFSHORE TASMANIA, AUSTRALIA

CONTENTS **PAGE**

1 SUMMARY 3

2 INTRODUCTION 4

Figure 1 : Zonal Framework
Figure 2 : Maturity Profile : WHITE IBIS-1

3 PALYNOSTRATIGRAPHY 5

4 CONCLUSIONS 7

5 REFERENCES 7

APPENDIX 1 : Palynological Data Charts

1 SUMMARY

1967.0 m (swc) : Upper *Lygistepollenites balmei* Zone (*Apectodinium homomorphum* Dinoflagellate Zone) : late Paleocene : nearshore marine : marginally mature for oil

1991.7 m (swc) - 2098.1 m (swc) : Lower *Lygistepollenites balmei* Zone : early Paleocene : marginally marine (1991.7 m, 2071.8 m) to freshwater (1998.2 m, 2027.1 m, 2043.0 m, 2098.1 m) : marginally mature for oil

2125.5 m (swc) - 2156.3 m (swc) : Upper *Tricolpites longus* Zone : late Maastrichtian : non-marine lacustrine (2125.5 m, 2140.0 m) to marginal marine (2156.3 m) : marginally mature near early mature for oil

2 INTRODUCTION

Ten sidewall core samples were examined to provide control after the drilling of the well, and are reported herein.

Palynomorph occurrence data are presented in Appendix 1, and are the basis for the assignment of the studied section to three spore-pollen Zones of Maastrichtian to Paleocene age. Quantitative data is based on a 100 specimen count. The zonation is that of Stover and Evans (1973) and Stover and Partridge (1973), set up in the Gippsland Basin, and modified for the Bass Basin by Partridge (1973), and the framework is given in Fibure 1.

No formal dinoflagellate zonation has been published for the Gippsland or Bass Basins, although Harris (1985) has published some dinoflagellate zones for part of the Eocene of the Otway and St. Vincent Basins. Partridge (1976) published a table showing zone names in the Gippsland Basin but charts defining these zones were never published. The dinoflagellate zones on figure 1 are therefore unpublished but have been widely used in unpublished reports.

Maturity data was generated in the form of Spore Colour Index, and is plotted on Figure 2 Maturity Profile of White Ibis-1. The oil and gas windows on Figure 2 follow the general consensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (Staplin Spore Colour Index of 2.7) to dark brown (3.6). These correspond to vitrinite reflectance values of 0.6% to 1.3%. Geochemists argue variations on kerogen type, basin type and basin history. The maturity data is thus open to reinterpretation using the basic colour observations as basic data.

570455

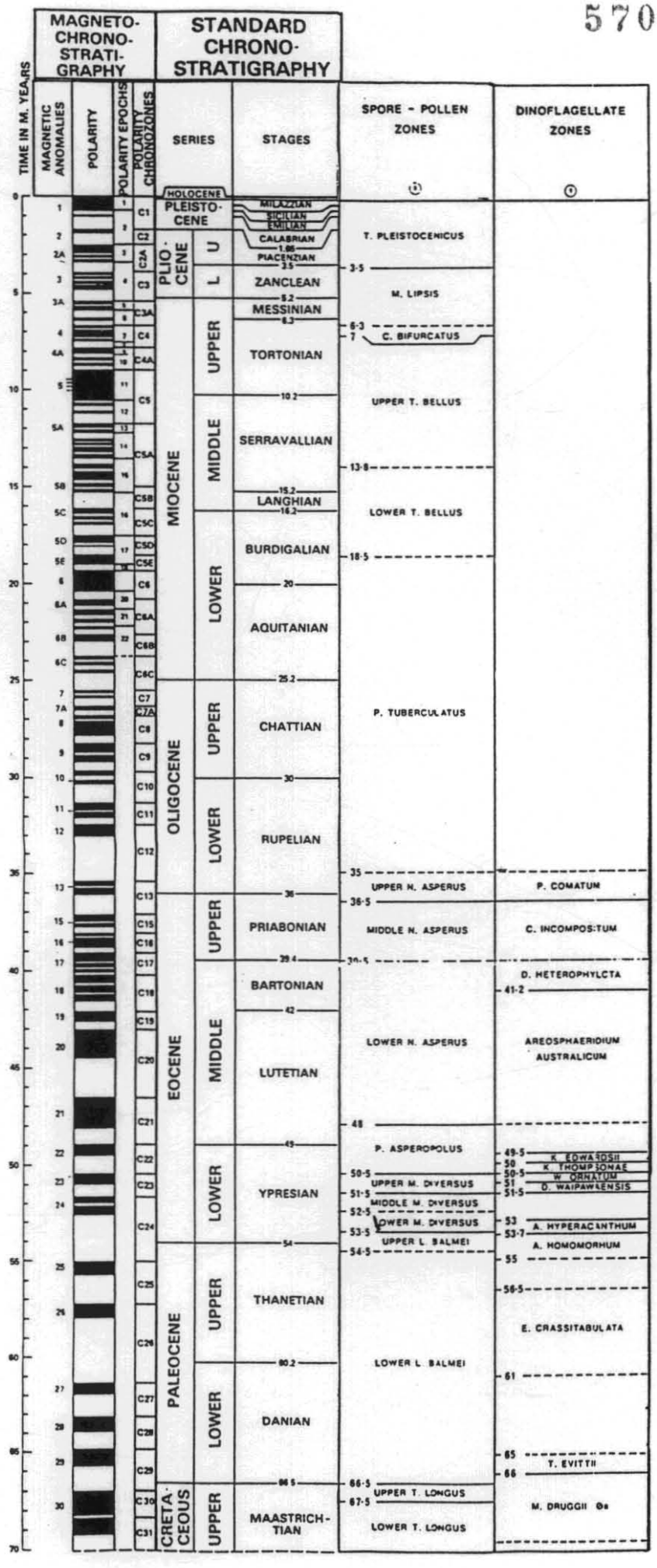


FIGURE 1 ZONAL FRAMEWORK

5 cm

570456

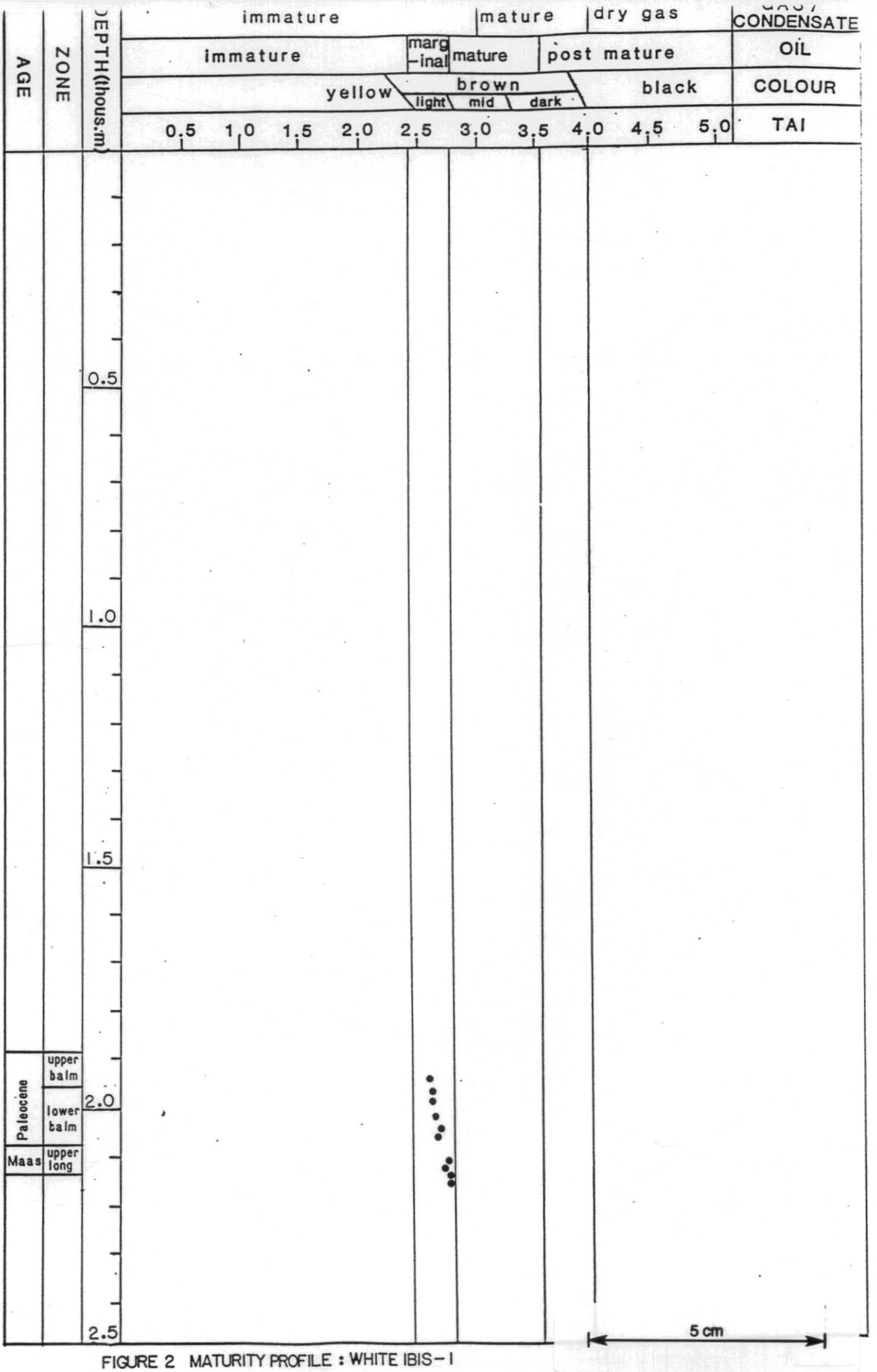


FIGURE 2 MATURITY PROFILE : WHITE IBIS-1

3 PALYNOSTRATIGRAPHY

3.1 1967.0 m (swc) : Upper *L. balmei* Zone

Assignment to the Upper Subzone of the *Lygistepollenites balmei* Zone is indicated by *L. balmei* and *Gambierina rudata* at the top and oldest *Proteacidites grandis, Proteacidites incurvatus* and *Malvacipollis subtilis* at the base. Overall, *Dilwynites granulatus* is abundant with common *Falcisporites similis* and frequent *Gleicheniidites circinidites.* Rare elements include *C. gigantis, G. rudata, L. balmei, Nothofagidites emarcidus, P. grandis, P. incurvatus* and *Stereisporites punctatus.*

Dinoflagellates are common but low diversity, with *Apectodinium homomorphum* very common, *Spinidinium* sp. frequent and *Deflandrea truncata, Deflandrea pachyceros* and *Cordsphaeridium inodes* rare. The frequent *A. homorphum* without younger markers indicate the *A. homomorphum* Dinoflagellate Zone of Partridge (1976) of late Paleocene age.

Nearshore marine environments are indicated by the moderate dinoflagellate content and low diversity, amongst the dominant and highly diverse pollen and spores.

Light brown spore colours suggest marginal maturity for oil but immaturity for gas/condensate.

3.2 1991.7 m (swc) - 2098.1 m (swc) : Lower *L. balmei* Zone

Assignment to the Lower Subzone of the *L. balmei* Zone is indicated by *G. rudata* and *L. balmei* throughout and the lack of younger markers at the top and base. *L. balmei* was not seen below 2045.1 m (swc). *Polycolpites langstonei* occurs at 1991.7 m indicating the upper part of the Lower Subzone. Overall, *D. granulatus* and *F. similis* are common throughout, with intermittently common *N. emarcidus, Vitreisporites pallidus* and *Phyllocladidites mawsonii* and intermittently frequent *G. circinidites, Podosporites microsaccatus, Laevigatosporites ovatus* and *Cyathidites minor.* Rare elements include *Australopollis obscurus, G. rudata, L. balmei, Nothofagidites endurus, S. punctatus* and *Tricolpites gillii.*

Dinoflagellates are rare in some samples. At 1991.7 m (swc), rare *A. homomorphum* indicates the *A. homomorphum* Dinoflagellate Zone of late Paleocene age and the dinoflagellates *Saeptodinium* spp. and *Spiniferites ramosus*

indicate marginal marine environments. At 2071.8 m (swc) a single specimen of *S. ramosus* indicates marginally marine to brackish environments. At 1998.2 m (swc), 2043.0 m (swc) and 2098.1 m (swc), *Botryococcus* sp. and the presumed freshwater dinoflagellate *Saeptodinium* spp. occur and suggest non-marine swamp or lake environments. At 2027.1 m (swc) frequent *Botryococcus* sp. without any dinoflagellates indicates lacustrine environments.

Light brown spore colours indicate marginal maturity for oil and immaturity for gas/condensate.

3.3 2125.5 m (swc) - 2156.3 m (swc) : Upper *T. longus* Zone

Assignment to the late Maastrichtian Upper Subzone of the *Tricolpites longus* Zone is indicated at the top by youngest *Tricolpites longus, Tricolpites confessus* and *Tricolpites sabulosus* and at the base by oldest *S. punctatus*. Common are *C. minor* and *F. similis* with frequent *Araucariacites australis, L. ovatus, Microcachryidites antarticus* and *P. mawsonii*. Rare elements in most samples include *G. rudata, Herkosporites elliottii, N. endurus, S. punctatus, T. confessus* and *T. longus*. Rare elements seen intermittently include *Tetracolporites verrucosus* (2125.5 m swc), *Grapnelispora evansii* (2140.0 m swc), *Tricolporites lillei, Tricolpites waipawaensis* and *Triporopollenites sectilis* (all at 2156.3 m swc).

Environments are lacustrine at 2125.5 m (swc) and 2140.0 m (swc) as shown by common to abundant freshwater algae (*Botryococcus* sp.) amongst the dominant and diverse pollen and spores. At 2156.3 m (swc), a single *S. ramosus* with frequent *Botryococcus* sp. suggests marginal marine environments perhaps in a lagoonal setting with some saline tidal flushing.

Light brown to mid brown spore colours indicate marginal maturity near early mature for oil but immaturity for gas/condensate.

570459

4. CONCLUSIONS

4.1 The studied section includes the late Maastrichtian Upper *T. longus* Zone to late Paleocene Upper *L. balmei* Zone.

4.2 Environments are mostly non-marine, with minor marginal marine to brackish influence. At the top, however, nearshore marine environments are present.

4.3 The studied section is marginally mature for oil and immature for gas/condensate onstructure.

5. REFERENCES

Harris, W.K. (1985) Middle to Late Eocene Depositional Cycles and Dinoflagellates Zones in Southern Australis Spec. Publ., S. Aust. Dept. Mines and Energy 5 : 133-144

Partridge, A.D. (1973) Revision of the Spore-pollen Zonation in the Bass Basin Esso unpubl. palaeo. rept. 1973/4

Partridge A.D. (1976) The Geological Expression of Eustacy in the Early Tertiary of the Gippsland Basin Aust. Pet. Explor. Assoc. J., 16 : 73-72

Stover, L.E. and Evans, P.R. (1973) Upper Cretaceous - Eocene Spore Pollen Zoantions, offshore Gippsland Basin, Australia Spec. Publ. geol. soc. Aust., 4 : 55-72

Stover, L.E. and Partridge, A.D. (1973) Tertiary and Late Cretaceous Spores and Pollen from the Gippsland Basin, South-eastern Australia Proc. R. Soc. Vict., 85 : 237-286

570460

E WHITE IBIS #1

R E P O R T B Y:	MORGAN PALAEO ASSOCIATES, MAITLAND SA PHONE (08)88322795 FAX (08)88322798 EMAIL morganpalaeo@netyp.com.au
C L I E N T:	PREMIER
W E L L:	WHITE IBIS #1
F I E L D / A R E A:	BASS BASIN T/18P
A N A L Y S T:	ROGER MORGAN D A T E: AUGUST 1998
N O T E S:	DEPTHS ARE IN METRES. FIGURES ARE PERCENTAGES BASED ON 100 SPECIMEN COUNT. "X" INDICATES RARE PRESENCE OUTSIDE THE COUNT IN LEAN SAMPLES WITH LESS THAN 100 SPECIMENS "A"=ABUNDANT "C"=COMMON "F"=FREQUENT "R"=RARE

RANGE CHART OF OCCURRENCES BY LOWEST APPEARANCE (By Group)

570461

		1 ARAUCARIACITES AUSTRALIS	2 CLAVIFERA TRIPLEX	3 CYATHIDITES AUSTRALIS	4 CYATHIDITES MINOR	5 DILWYNITES GRANULATUS	6 FALCISPORITES SIMILIS	7 FOVEOTRILETES PARVIRETUS	8 GAMBIERINA RUDATA	9 HERKOSPORITES ELLIOTTII	10 LAEVIGATOSPORITES OVATUS	11 LATROBOSPORITES OHAIENSIS	12 MICROCACHRYIDITES ANTARCTICUS	13 NOTHOFAGUS FLEMINGII	14 NOTHOFAGUS ENDURUS	15 NOTHOFAGUS FLEMINGII	16 OSMUNDACIDITES WELLMANII	17 PHYLLOCLADIDITES MAWSONII	18 PODOSPORITES MICROSACCATUS	19 PROTEACIDITES RETICULATUS	20 PROTEACIDITES SPP.	21 RETITRILETES AUSTROCLAVATIDITES	22 STEREISPORITES ANTIQUISPORITES	23 STEREISPORITES PUNCTATUS	24 STEREISPORITES REGIUM	25 TRICOLPITES CONFESSUS	26 TRICOLPITES LONGUS	27 TRICOLPITES SABULOSUS	28 TRICOLPITES WAIPAWAENSIS	29 TRICOLPORITES LILLIEI	30 TRIPOROLETES RADIATUS	31 TRIPOROLETES RETICULATUS	32 TRIPOROPOLLENITES SECTILIS	33 VITREISPORITES PALLIDUS	34 CONEROZONOSPORITES OHAIENSIS	35 CERATOSPORITES EQUALIS	36 CYATHIDITES SPLENDENS	37 GRANELISPORA EVANSII	38 [illegible]
1967.0	SWC	.	2	.	2	35	10	.	1	.	1		.	X			1	1	.	.	1	1	X	1								1	1			
1991.7	SWC	2	1	3	5	19	15	.	X	1	1	.	2	3	1	.	5	3	3	.	5	X	X	X								3	X			
1998.2	SWC	5	X	1	4	25	16	.	X	1	.	.	5	3	1		.	1	8	.	3	X	1	X								14	.	X		
2027.1	SWC	.	X	1	5	4	10	.	X	.	6	.	3	35	.	?	3	13	4	.	3	1	.	.								5	.			
2043.1	SWC	.	.	1	9	7	14	.	X	.	1	.	8	.	2	.	.	20	8	.	.	.	.	.								14	.			
2071.8	SWC	2	.	1	14	28	12	.	X	1	3	.	5	X	1	.	2	1	5	X	2	2	X	.								6	1			
2098.1	SWC	5	1	1	8	18	21	.	3	2	1	.	2	X	X	.	.	5	3	.	1	1	1	1								11	.			
2125.5	SWC	4	1	1	10	.	15	1	3	X	7	.	7	.	3	.	.	3	3	X	5	3	X	1	1	1						2	3	1	1	
2140.0	SWC	4	.	3	12	1	11	2	.	1	6	.	.	.	1	.	2	1	.	.	1	4	2	2	.	.	1					2	.	2	2	X	
2156.3	SWC	5	1	4	8	4	24	1	3	1	6	X	6	X	2	X	X	5	3	X	3	2	1	1	1	2	X	X	X	X	?	2	.	X	X	.

1967.0 SWC	1991.7 SWC	1998.2 SWC	2027.1 SWC	2043.1 SWC	2071.8 SWC	2098.1 SWC	2125.5 SWC	2140.0 SWC	2156.3 SWC		
·	X	X	X·	2	1	1	2	X	·	39	TRICOLPITES GILLII
·	X	X	·	2	1	·	1	·	·	40	AUSTRALOPOLLIS OBSCURUS
·	·	·	·	·	·	·	X	·	·	41	INTERULOBITES INTRAVERRUCATUS
·	·	·	·	·	·	·	X	·	·	42	PROTEACIDITES CLAVUS
·	·	·	·	·	·	·	5	·	·	43	TETRACOLPORITES VERRUCOSUS
·	·	·	·	·	·	·	X	·	·	44	TRIPOROPOLLENITES SPP.
·	·	·	1	10	3	·	X	·	·	45	GLEICHENIIDITES CIRCINIDITES
·	·	·	3	2	1	X	X	·	·	46	LYGISTEPOLLENITES FLORINII
X	·	·	·	·	·	·	1	·	·	47	PERIPOROPOLLENITES POLYORATUS
·	·	·	·	·	1	·	·	·	·	48	CYCADOPITES FOLLICULARIS
2	X	X	·	X	·	X	·	·	·	49	LYGISTEPOLLENITES BALMEI
X	·	1	·	·	·	·	·	·	·	50	CYATHIDITES GIGANTIS
·	·	4	·	·	·	·	·	·	·	51	DICTYOPHYLLIDITES HARRISII
·	·	X	·	·	·	·	·	·	·	52	GAMBIERINA EDWARDSII
·	·	2	·	·	·	·	·	·	·	53	PERIPOROPOLLENITES DEMARCATUS
·	·	X	·	·	·	·	·	·	·	54	PERORILETES MORGANII
X	·	2	·	·	·	·	·	·	·	55	PROTEACIDITES GRANDIS
·	·	2	·	·	·	·	·	·	·	56	POLYCOLPITES LANGSTONII
·	·	X	·	·	·	·	·	·	·	57	VERRUCOSISPORITES KOPUKUENSIS
X	X	·	·	·	·	·	·	·	·	58	CAMEROZONOSPORITES BULLATUS
X	X	·	·	·	·	·	·	·	·	59	MALVACIPOLLIS SUBTILIS
1	·	·	·	·	·	·	·	·	·	60	PROTEACIDITES ADENANTHOIDES
X	X	·	·	·	·	·	·	·	·	61	PROTEACIDITES INCURVATUS
X	X	·	·	·	·	·	·	·	·	62	VERRUCATOSPORITES SP.
·	X	·	·	·	1	·	·	·	1	63	SPINIFERITES RAMOSUS
·	·	·	·	·	·	2	·	·	·	64	MORKALLACYSTA SP.
5	X	X	·	X	X	5	·	·	·	65	SAEPTODINIUM SPP.
24	X	·	·	·	·	·	·	·	·	66	APECTODINIUM HOMOMORPHUM
1	·	·	·	·	·	·	·	·	·	67	CORDOSPHAERIDIUM INODES
X	·	·	·	·	·	·	·	·	·	68	DEFLANDREA PACHYCEROS
1	·	·	·	·	·	·	·	·	·	69	DEFLANDREA TRUNCATA
5	·	·	·	·	·	·	·	·	·	70	SPINIDINIUM SP.
X	·	·	·	·	·	·	·	·	·	71	MICRHYSTRIDIUM SPP.
1	·	·	·	·	·	·	·	·	·	72	MICROFORAMS
1	1	7	3	5	11	5	6	15	42	73	BOTRYOCOCCUS SP.
2	X	X	·	·	·	1	·	·	·	74	CYCLOSPSIELLA VIETA
·	·	·	·	·	·	2	·	·	·	75	DIAPHANOUS LEIOSPHERES
X	·	·	·	·	·	·	·	·	·	76	[illegible]

570462

SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
66	APECTODINIUM HOMOMORPHUM
1	ARAUCARIACITES AUSTRALIS
40	AUSTRALOPOLLIS OBSCURUS
73	BOTRYOCOCCUS SP.
58	CAMEROZONOSPORITES BULLATUS
34	CAMEROZONOSPORITES OHAIENSIS
35	CERATOSPORITES EQUALIS
2	CLAVIFERA TRIPLEX
67	CORDOSPHAERIDIUM INODES
3	CYATHIDITES AUSTRALIS
50	CYATHIDITES GIGANTIS
4	CYATHIDITES MINOR
36	CYATHIDITES SPLENDENS
48	CYCADOPITES FOLLICULARIS
74	CYCLOSPSIELLA VIETA
68	DEFLANDREA PACHYCEROS
69	DEFLANDREA TRUNCATA
75	DIAPHANOUS LEIOSPHERES
51	DICTYOPHYLLIDITES HARRISII
5	DILWYNITES GRANULATUS
6	FALCISPORITES SIMILIS
7	FOVEOTRILETES PARVIRETUS
52	GAMBIERINA EDWARDSII
8	GAMBIERINA RUDATA
45	GLEICHENIIDITES CIRCINIDITES
37	GRAPNELISPORA EVANSII
9	HERKOSPORITES ELLIOTTII
41	INTERULOBITES INTRAVERRUCATUS
10	LAEVIGATOSPORITES OVATUS
11	LATROBOSPORITES OHAIENSIS
49	LYGISTEPOLLENITES BALMEI
46	LYGISTEPOLLENITES FLORINII
59	MALVACIPOLLIS SUBTILIS
71	MICRHYSTRIDIUM SPP.
12	MICROCACHRYIDITES ANTARCTICUS
72	MICROFORAMS
64	MORKALLACYSTA SP.
13	NOTHOFAGUS EMARCIDUS/HETERUS
14	NOTHOFAGUS ENDURUS
38	NOTHOFAGUS FALCATUS
15	NOTHOFAGUS FLEMINGII
16	OSMUNDACIDITES WELLMANII
76	PARALECANIELLA INDENTATA
53	PERIPOROPOLLENITES DEMARCATUS
47	PERIPOROPOLLENITES POLYORATUS
54	PERORILETES MORGANII
17	PHYLLOCLADIDITES MAWSONII
18	PODOSPORITES MICROSACCATUS
56	POLYCOLPITES LANGSTONII
60	PROTEACIDITES ADENANTHOIDES
42	PROTEACIDITES CLAVUS
55	PROTEACIDITES GRANDIS
61	PROTEACIDITES INCURVATUS
19	PROTEACIDITES RETICULATUS
20	PROTEACIDITES SPP.
21	RETITRILETES AUSTROCLAVATIDITES
65	SAEPTODINIUM SPP.
70	SPINIDINIUM SP.
63	SPINIFERITES RAMOSUS
22	STEREISPORITES ANTIQUISPORITES
23	STEREISPORITES PUNCTATUS
24	STEREISPORITES REGIUM
43	TETRACOLPORITES VERRUCOSUS

21	RETITRILETES AUSTROCLAVATIDITES
65	SAEPTODINIUM SPP.
70	SPINIDINIUM SP.
63	SPINIFERITES RAMOSUS
22	STEREISPORITES ANTIQUISPORITES
23	STEREISPORITES PUNCTATUS
24	STEREISPORITES REGIUM
43	TETRACOLPORITES VERRUCOSUS
25	TRICOLPITES CONFESSUS
39	TRICOLPITES GILLII
26	TRICOLPITES LONGUS
27	TRICOLPITES SABULOSUS
28	TRICOLPITES WAIPAWAENSIS
29	TRICOLPORITES LILLIEI
30	TRIPOROLETES RADIATUS
31	TRIPOROLETES RETICULATUS
32	TRIPOROPOLLENITES SECTILIS
44	TRIPOROPOLLENITES SPP.
62	VERRUCATOSPORITES SP.
57	VERRUCOSISPORITES KOPUKUENSIS
33	VITREISPORITES PALLIDUS

PremierOil
Australasia

COMPOSITE WELL LOG

WHITE IBIS 1

Scale 1:500

LOCATION: LAT: 38° 07' 49.62" S
LONG: 147° 23' 28.68" E

ELEVATIONS: KB: 23.00M
WATER DEPTH: -67.0m

DATES: SPUD: 21/12/2012 PERFORATIONS: NONE

RIG NUMBER: Ocean Ohio
DATE AT TOTAL DEPTH: 30-Dec-12/Mar
DATE RELEASED: 30-Dec-12/Mar

POINT: 11.18°

TOTAL DEPTH: 2554.0RT

DRILLING CONTRACTOR: NOTTON OFFSHORE

WHOLE LOCATION BY: ECLIPSE/TECH
CHEMISTRY: SYMEC/
WELL LOGGED BY: OCEANICS

REGION: SOUTHERN AUSTRALIA

WELL STATUS: SUSPENDED (TUBINGLESS)
SUSPENDED GAS DISCOVERY

WELL/OPERATOR/CONTRACTOR/REGION/STATUS/DATE

LOG COMPLETED: 1 DRILLSTEM & 2 Cased
DRAFTING: Max Duffing Nunn

ELECTRIC LOG DATA

LOG RUN NUMBER	1	2	3	4
LOGGING COMPANY	Schlumberger	Schlumberger	Schlumberger	Schlumberger
RUN	1	1	1	1
LOGGING RECORDED	1ST RUN/MD	1ST RUN/MD	1ST RUN/MD	2ND RUN/MD
MUD TYPE	KCL POLY	KCL POLY	KCL POLY	KCL POLY
MUD DENSITY (ppg)	8.5	8.5	8.5	8.5
MUD VISC (sec)	6.5/8 @ 5°C	6.5/8 @ 5°C	6.5/8 @ 5°C	6.5/8 @ 5°C
MEASURED PIT °C	30°C	30°C	30°C	30°C

CASING

SIZE	WEIGHT	INTERVAL
30"	310#/F	91/449
20"	133#/F	91/449
13 3/8"	61#/F	91/449

CEMENT PLUGS

TYPE	TOP	COMMENT
CIB	1500m	
CIB	1000m	
CIB	100m	

HOLE SIZE

SIZE	TOP	TO
36"	91	449
26"	449	1000
17 1/2"	1000	2554

CORING

CORE No.	INTERVAL TOP	INTERVAL BOTTOM	RECOVERY %
1	1500	1509	100

DST

DST NUMBER	FORMATION TESTED	INTERVAL TO
NO DSTs CARRIED OUT		

OTHER LOGS

1A	1B	1C
1ST RUN/MD	1ST RUN/MD	2ND RUN/MD
CDS (SHAME)	CDN (SAM)	CDS (SHAME)
ALL TAPE	ALL TAPE	ALL TAPE
6.5/8 @ 5°C	6.5/8 @ 5°C	6.5/8 @ 5°C
30°C	30°C	30°C

LITHOLOGY SYMBOLS

ROCK TYPE

- ARGILLACEOUS LIMESTONE
- ARGILLACEOUS SANDSTONE
- ARGILLITE
- ARKOSE
- BASALT
- BASEMENT
- BIOCLASTIC LIMESTONE
- BIOTURBATED
- BRECCIA
- CALCAREOUS SANDSTONE
- CALCARENITE
- CALCILUTITE
- CALCIRUDITE
- CALCISILTITE
- CHALK
- CHERT
- CLAYSTONE
- COAL
- CONGLOMERATE
- DOLOMITE
- DOLOMITIC LIMESTONE
- DOLOMITIC SANDSTONE
- DOLOMITIC SILTSTONE
- FOSSILIFEROUS
- GLAUCONITIC SANDSTONE
- GRANITE
- GRANULE CONGLOMERATE
- GRAVELLY SANDSTONE
- GREYWACKE
- LIMESTONE
- MARL
- METAMORPHIC
- MUDSTONE
- OOLITIC LIMESTONE
- PEBBLE CONGLOMERATE
- PEBBLY SANDSTONE
- PHOSPHATIC
- PISOLITIC LIMESTONE
- QUARTZ SANDSTONE
- QUARTZITE
- RHYOLITE
- SALT
- SANDSTONE
- SHALE
- SILTSTONE
- SPICULITE
- TUFF
- VOLCANIC

OTHER CONSTITUENTS

- ANHYDRITE
- ARGILLACEOUS
- BIOTURBATED
- CALCAREOUS
- CARBONACEOUS
- CHERTY
- FERRUGINOUS
- FOSSILIFEROUS
- GLAUCONITIC
- GRAVELLY
- MICACEOUS
- PEBBLY
- PHOSPHATIC
- PYRITE
- QUARTZOSE
- SANDY
- SILICIFIED
- SILTY
- TUFFACEOUS

ENGINEERING SYMBOLS

CASING SHOE
- CASING SHOE
- CEMENT PLUG
- CORE
- DRILLSTEM TEST
- FORMATION INTEGRITY TEST
- LEAK OFF TEST
- PERFORATIONS
- WIRELINE RUN

SHOW LEGEND

- OIL SHOW IN CORE
- OIL SHOW IN CUTTINGS
- OIL SHOW IN DRILLING MUD
- OIL SHOW IN CORE
- OIL SHOW IN CUTTINGS
- OIL SHOW IN DRILLING MUD
- GAS SHOW IN CORE
- GAS SHOW IN CUTTINGS
- GAS SHOW IN DRILLING MUD
- OIL STAIN IN CORE
- OIL STAIN IN CUTTINGS
- OIL STAIN IN DRILLING MUD
- OIL FLUORESCENCE IN CORE
- OIL FLUORESCENCE IN CUTTINGS
- OIL FLUORESCENCE IN DRILLING MUD
- OIL FLUORESCENCE IN SIDEWALL

Claystone: light grey to occasional light brown grey, slightly calcareous decreasing with depth, arenaceous in part grading to Siltstone, common black carbonaceous specks, trace micro-micaceous, trace disseminated and nodule pyrite, trace fossil fragments, soft to sticky, occasionally firm, blocky to sub blocky, slightly fissile in part.

Siltstone: light grey brown-brown white, moderately calcareous cement, common very fine grained well rounded quartz, argillaceous in parts, grades to very fine Sandstone in part, trace carbonaceous specks, trace glauconite, rare pyrite, moderately hard-hard, sub blocky to blocky.

Limestone: yellow grey to white, microcrystalline, very calcareous, slightly dolomitic, trace forams and fossil fragments, soft-moderately hard, no visual porosity.

Sandstone: light grey to light brown, very fine to fine grained, sub angular to sub rounded, moderately well sorted, moderately hard calcareous cement, trace kaolinite matrix, trace pyrite, trace glauconite, fossil fragments, trace black carbonaceous specks, poor inferred porosity, grades to Calcisiltite in part, no fluorescence.

Demons Bluff Formation (Late Eocene) 1430m MD

1430 - 1577mMD.

Siltstone: light-grey brown-medium brown-dusky brown-dusky yellow brown, moderately hardfirm, occasionally soft, dispersive-amorphous, subblocky-blocky, occasionally subfissile, argillaceous in parts, moderately dolomitic cement, common very fine grained quartz, grades to very fine grained Sandstone in parts, trace glauconite, trace micromica, trace-common disseminated pyrite, trace pyrite nodules, trace fossil fragments.

Sandstone: light grey brown to moderate yellow brown, very fine-occasionally fine grained, firm-occasionally hard aggregates, sub angular to subrounded, moderately well sorted, trace pyrite, trace micromica, trace carbonaceous specks, trace fossil fragments, common dolomitic cement, trace siliceous cement, common clay matrix, poor inferred porosity, no fluorescence.

Claystone: Light blue grey-dusky brown, dusky brown, occasionally dark grey-brown black-black, soft-plastic, occasionally firm, subblocky-blocky, occasionally subfissile-fissile, dispersive in parts, non-slightly calcareous, trace very fine grained quartz, trace micromica, common disseminated pyrite, occasionally pyrite nodules, trace black carbonaceous specks, trace fossil fragments.

Dolomite: light-medium brown, firm-hard, occasionally soft, blocky, microcrystalline, silty, trace very fine grained quartz, grades to dolomitic Sandstone in parts, dull yellow mineral fluor, no cut fluorescence.

TOP EVCM 1577m MD

Siltstone with minor Claystone interbeds and minor to trace Sandstone
1577 - 2173mMD.
Siltstone: light brown to brown, moderate yellow brown, occasional dark brown, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Claystone: grey brown to dark yellow brown, non calcareous, nil to slightly silty, none calcareous, disseminated and nodule pyrite, trace carbonaceous specks, trace to common fossil fragments, trace mica, sub blocky to amorphous in part, soft to firm.
Sandstone: light grey, transparent-translucent, very fine to fine grained, occasionally medium grained angular to sub-rounded, moderately well sorted, minor glauconite, common carbonaceous specks, trace pyrite, dominantly loose, occasional dolomitic cement and kaolin matrix, hard to friable in part, poor visual porosity, no fluorescence.

Sandstone with minor Siltstone & Claystone
1604 - 1640mMD.
Sandstone: clear to light grey, transparent to translucent, occasional coarse milky quartz grains, very fine to fine grained, predominantly very fine grained, occasionally medium grained, angular to sub-rounded, moderately well sorted, dolomitic cement, weak argillaceous matrix, trace disseminated pyrite, trace glauconite, common carbonaceous material, poor visual porosity, no fluorescence.
Siltstone: light brown to moderate yellow brown, occasionally dark brown grey, soft-dispersive, occasionally firm-hard, blocky-subblocky, none to slightly calcareous, argillaceous matrix, trace-common micromica, trace pyrite, trace fossil fragments, trace carbonaceous specks.
Claystone: grey brown to dark yellow brown, silty, trace very fine green quartz, trace glauconite, trace micromica, common disseminated pyrite, trace to common fossil fragments, soft to firm, sub-blocky to blocky, occasionally dispersive/washable.

Claystone interbedded with minor Siltstone & Sandstone
1640 - 1685mMD.
Claystone: light brown to light brown grey, grey, very slightly silty in part, common micro micaceous, disseminated pyrite, trace carbonaceous specks, slightly calcareous, sticky, very soft to firm, sub bulky to amorphous in part.
Siltstone: yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Sandstone: light grey, occasional yellow brown, transparent-translucent, very fine to fine grain, moderately well sorted, sub angular to sub rounded, rare glauconite, trace red lithics, trace carbonaceous specks, weak kaolin matrix and calcareous cement, moderately hard to friable, fair inferred porosity, trace mineral fluorescence.

Claystone with minor Sandstone, Siltstone & Shale interbeds
1685 - 1730mMD.
Claystone: white, light grey, occasional grey brown, greenish grey, trace mica and pyrite, carbonaceous specks, nil calcareous, slightly sticky, very soft to soft, occasionally firm, amorphous to sub blocky.
Sandstone: light grey, transparent-translucent, white, very fine to medium grain, occasional coarse, moderately well sorted, sub angular to sub rounded, trace pyrite and mica, trace red lithics, weak calcareous cement, kaolin matrix, loose to friable, poor inferred porosity, trace mineral fluorescence.
Siltstone: yellow brown to brown, occasional medium grey, very fine silt size quartz grains, common micro-micaceous, carbonaceous material, trace disseminated pyrite, slightly calcareous, soft to firm, blocky to common sub blocky.
Shale: medium grey, green grey, occasional light brown grey, slightly silty, micro micaceous, moderately calcareous, trace disseminated and nodule pyrite, trace carbonaceous specks, trace very fine quartz grains in part, firm to slightly hard, sub blocky to fissile, occasional semi laminated.

Sandstone with minor Claystone & Siltstone interbeds
1730 - 1770mMD.
Sandstone: clear, light grey, very fine to medium grain, occasional coarse, poor to moderately sorted, sub angular to sub rounded, occasional angular, trace disseminated pyrite, trace micro micaceous, trace carbonaceous specks, trace glauconite, rare red lithics, minor aggregates with kaolin matrix, minor calcareous cement, poor visible porosity, no fluorescence.
Claystone: light brown, brown grey, silty, slightly calcareous, trace disseminated pyrite, micro micaceous, trace carbonaceous fleck, trace lithic, sub blocky to amorphous, sticky, soft to firm.
Siltstone: light brown grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae with depth, firm to moderately hard, massive to sub blocky.

Sandstone with interbedded Claystone
1770 - 1942mMD.
Sandstone: light brown, light grey, translucent to transparent, white, very fine to very coarse grain, common coarse, poorly sorted, sub rounded to angular, trace disseminated pyrite & mica, trace siderite, weak to non calcareous cement, trace siliceous cement, trace kaolin matrix, friable to loose, good visible-inferred porosity, no to trace mineral fluorescence with depth.
Claystone: light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, soft to firm, sub blocky to blocky, grading to Siltstone.
Siltstone: medium brown grey, dark grey, locally very argillaceous grading to Claystone, slightly arenaceous in part, micro micaceous, common carbonaceous specks and laminae, trace pyrite, calcareous in part, trace Limestone, trace very fine quartz grains, firm to moderately hard, sub blocky to sub fissile.

PALAEOCENE 1942m MD

Sandstone with interbedded Claystone with minor Siltstone & trace Coal seams
1942 - 2001.5mMD.
Sandstone: light brown, light grey, dominantly translucent to transparent, white, fine to very coarse grain, common medium, poorly sorted, sub rounded to angular, trace disseminated pyrite & mica, trace siderite, weak to non calcareous cement, siliceous cement, trace kaolin matrix, friable to loose, fair inferred porosity, nil fluorescence.
Claystone: light brown, grey brown, grey green in part, slightly silty, micro micaceous, non to slightly calcareous, trace disseminated pyrite, trace carbonaceous specks, soft to firm, sub blocky to blocky, grading to Siltstone.

EVCM 2002 SAND 2002m MD

2001.5 - 2024.5mMD.
Sandstone: clear to light grey, transparent to translucent, fine-coarse grained, predominantly fine to medium grained, occasional very coarse grains, loose, rounded to subrounded, moderately well sorted, predominantly loose with occasional cemented aggregates, trace carbonaceous specks, trace kaolinite matrix, trace red lithic fragments, good inferred porosity.
2007 - 2008mMD
Fluorescence: Trace faint dull yellow to yellowish orange fluorescence, slow weak streaming dull yellow to yellowish white cut fluorescence, dull yellow white to orangish white residual ring.

2008 - 2008.72mMD
CORE#1 : 2008 - 2017mMD. Recovered 8%
Sandstone: Light grey, off white, light brown-frosted, translucent, very fine to coarse grained, predominantly fine to medium, moderately well sorted, sub rounded to sub angular, common kaolinite matrix, siliceous cement, trace carbonaceous matter, trace lithic fragments, trace mica flakes, friable, poor-moderate visible porosity.
Fluorescence: trace, dull yellow white pinpoint fluorescence, slow streaming dull greyish white cut, bright chalky white residual ring.

2024.5 - 2044mMD
Siltstone: medium to dark grey-brown commonly micromicaceous, trace disseminated pyrite, rare to common black carbonaceous material, common very fine quartz grains, clay matrix, firm to brittle, sub blocky to sub fissile.
Claystone light grey to grey occasionally brown grey and green grey, calcareous, silty in parts, trace pyrite, trace micromicaceous, soft to firm, sub blocky to blocky.
Sandstone: as above
Coal: trace, black, dark brown black, dull to sub vitreous lustre, common silty, trace disseminated and nodule pyrite interbedded in part, sub conchoidal fracture, sub blocky to sub fissile, brittle to hard.

EVCM 2044 SAND 2044m MD

2044 - 2053mMD.
Sandstone: clear to light grey, transparent to translucent, fine-coarse grained, predominantly fine to medium grained, occasional very coarse grains, loose, angular to subrounded, moderately sorted, predominantley loose with occasional cemented aggregates, trace carbonaceous specks, trace kaolinite matrix, good inferred porosity.
2053 - 2128mMD.
Claystone: light grey to grey occasionally brown grey and green grey, calcareous, silty in parts, trace pyrite, trace micromicaceous, soft to firm, sub-blocky to blocky.
Siltstone: medium to dark grey-brown commonly micromicaceous, trace disseminated pyrite, rare to common black carbonaceous material, common very fine quartz grains, clay matrix, firm to brittle, sub blocky to sub fissile.
Sandstone as above

EVCM 2128 SAND 2128m MD

2128 - 2140mMD.
Sandstone: clear to light grey, transparent to translucent, very fine to very coarse grained, predominantly coarse grained, angular to subrounded, moderately sorted, trace kaolinite matrix, trace mica, trace pyrite, predominantly loose occasional aggregates, fair-good inferred porosity.
2140 - 2158mMD.
Siltstone: medium brown to dark grey brown in parts, firm-moderately hard, sub blocky to sub fissile, trace micromica and pyrite, locally common carbonaceous/coaly fragments/laminae, arenaceous in parts & grading to very fine silty sandstone.
Claystone: light to medium grey, brown grey to green grey in parts, firm-moderately hard, blocky-subfissile, slightly calcareous, micromica, trace pyrite fragments, silty in parts.
Sandstone as above

METAMORPHIC BASEMENT 2158m MD

2158 - 2173mMD.
Sandstone/Weathered Basement clean grains to light grey, transparent to translucent, very fine becoming very coarse with depth, moderate to well sorted loose grains becoming very hard and dense, common felspar, mica, horneblende?, pyroxene increasing amounts of light blue green weathered metaquartzite
2173 - 2223mMD TD.
Metamorphic: White to milky white, translucent to transparent, pale red, purple to pink, occasional yellow brown & pale green, common blocky angular fragments, common feldspars and occasionally altered to kaolin, angular quartz crystals, trace pyrite and mica, trace dark green hornblende and black pyroxene, hard to very hard, common massive texture and granular in part.

Stratigraphic unit	Series / Epoch	Period	Interval
DEMONS BLUFF			1430 - 1577m MD
EASTERN VIEW COAL MEASURES	EOCENE	TERTIARY	1577 - 1942m MD
EASTERN VIEW COAL MEASURES	PALAEOCENE	TERTIARY	1942 - 2044m MD
EASTERN VIEW COAL MEASURES	LATE CRETACEOUS	CRETACEOUS	2044 - 2158m MD
BASEMENT		CAMBRIAN	2158m MD - TD

GAMMA RAY	DEPTH	DEEP LATEROLOG	DENSITY
0 API 200	M 1:500	.20 OHMM 2000	1.95 G/CC 2.95
CALIPER		SHALLOW LATEROLOG	HTNP
6 INCH 16		.20 OHMM 2000	45 % -15
SP		MICRO SFL	DT
-100 MV 100		.20 OHMM 2000	140 US/F 40
			PEFZ 0 10
			HDRA -.25 G/CC .25

LITHOLOGICAL DESCRIPTION

STRATIGRAPHIC UNIT | SERIES / EPOCH | PERIOD

FORMATION EVALUATION LOG
WELL : WHITE IRIS 1

Prepared for: Texas Oil
Date: 1 Jan 1987

Prepared by: Interpretation Co.
Engineer: Jane Doe

Location: SECTION 1
Name: WHITE IRIS 1
Field: IRIS
County: IRIS COUNTY
State: TEXAS
Country: UNITED STATES
Rig Name: UNKNOWN

API Number: N/A
Permanent Datum: GROUND LEVEL
Log Measured From: KELLY BUSHING
Drilling Measured From: KB

Elev. KB: 1012.7 FEET
Elev. Ground Level: 1000 FEET
Elev. Permanent Datum: 1000 FEET

DRILLING PARAMETERS

BIT RECORD
1 - 26" HTC OSC1G 0 - 1000 FEET
2 - 17.5" HTC OSC1G 1000 - 3000 FEET
3 - 12.25" HTC OSC1G 3000 - 6000 FEET
4 - 8.5" HTC OSC1G 6000 - 9000 FEET

MUD RECORD
1 - 0 - 1000 FEET SPUD MUD
2 - 1000 - 3000 FEET GEL CHEM
3 - 3000 - 6000 FEET GEL CHEM
4 - 6000 - 9000 FEET GEL CHEM

CASING RECORD
1 - 20" 94 LB/FT H-40 @ 1000 FEET
2 - 13.375" 68 LB/FT K-55 @ 3000 FEET
3 - 9.625" 47 LB/FT N-80 @ 6000 FEET
4 - 7" 29 LB/FT P-110 @ 9000 FEET

LITHOLOGY LEGEND

Shale
Sandstone
Siltstone
Limestone
Dolomite
Coal
Anhydrite
Salt
Gypsum
Conglomerate
Chalk
Marl
Tuff
Fossiliferous

SHADINGS LEGEND

Hydrocarbon
Water
Tight
Cement
Lost Circulation
Gas Kick
Mud Weight
Core Recovered

LITHOLOGY SHADINGS

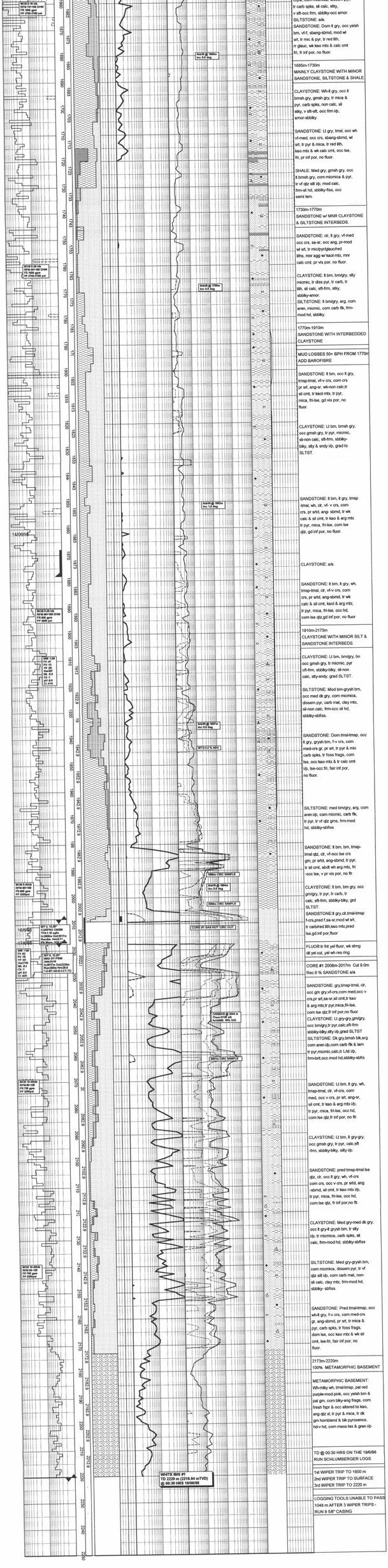
Sandstone
Limestone
Dolomite
Shale
Coal
Anhydrite
Salt
Gypsum
Conglomerate
Chalk
Marl
Tuff
Fossiliferous

DRILLING PARAMETERS

WOB (1000 LBF)
ROP (FEET/HOUR)
RPM
Mud Weight (LB/GAL)
Gas (UNITS)
Cement

DRILLING SHADINGS

Lost Circulation
Gas Kick
Cement


MUD LOSSES 50+ BPH FROM 1770m ADD BAROFIBRE
1730m-1770m SANDSTONE w/ MNR CLAYSTONE & SILTSTONE INTERBEDS.
1770m-1910m SANDSTONE WITH INTERBEDDED CLAYSTONE
1910m-2173m CLAYSTONE WITH MINOR SILT & SANDSTONE INTERBEDS.
2173m-2220m 100% METAMORPHIC BASEMENT
TD @ 00:30 HRS ON THE 19/6/98 RUN SCHLUMBERGER LOGS
1st WIPER TRIP TO 1600 m
2nd WIPER TRIP TO SURFACE
3rd WIPER TRIP TO 2220 m
LOGGING TOOLS UNABLE TO PASS 1046 m AFTER 3 WIPER TRIPS - RUN 9 5/8" CASING
WHITE ISIS #1 TD 2220 m (2219.94 mTVD) @ 00:30 HRS 19/06/98
5 cm